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ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

CIVIL ENGINEERING

For

B.Tech., FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2013-14)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533003, ANDHRA PRADESH, INDIA.
Academic Regulations (R13) for B. Tech. (Regular)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 onwards

1. Award of B. Tech. Degree
   
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
   
   1. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
   2. The candidate shall register for 180 credits and secure all the 180 credits.

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

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<td>Electronics and Communication Engineering</td>
</tr>
<tr>
<td>02</td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td>03</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>04</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>05</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>06</td>
<td>Petro Chemical Engineering</td>
</tr>
<tr>
<td>07</td>
<td>Information Technology</td>
</tr>
<tr>
<td>08</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>09</td>
<td>Electronics and Instrumentation Engineering</td>
</tr>
<tr>
<td>10</td>
<td>Bio-Medical Engineering</td>
</tr>
<tr>
<td>11</td>
<td>Aeronautical Engineering</td>
</tr>
<tr>
<td>12</td>
<td>Automobile Engineering</td>
</tr>
<tr>
<td>13</td>
<td>Bio Technology</td>
</tr>
<tr>
<td>14</td>
<td>Electronics and Computer Engineering</td>
</tr>
<tr>
<td>15</td>
<td>Mining Engineering</td>
</tr>
<tr>
<td>16</td>
<td>Petroleum Engineering</td>
</tr>
<tr>
<td>17</td>
<td>Metallurgical Engineering</td>
</tr>
<tr>
<td>18</td>
<td>Agricultural Engineering</td>
</tr>
</tbody>
</table>
3. **Distribution and Weightage of Marks**

(i) The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

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

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of \( \frac{1}{2} \) Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain **3 questions** and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation ( 20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.
(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. 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 conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. Attendance Requirements

1. A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

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

3. Shortage of Attendance below 65% in aggregate shall not be condoned.

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

5. Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
6. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) credits.

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

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

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

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

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement of **40% of the credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**

5.4 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

6. **Course pattern**

1. The entire course of study is for four academic years, all the years are on semester pattern.

2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

7. **Award of Class**

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 180 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70 but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

8. **Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

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

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.
12. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.

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

13. **General**

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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

3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

4. The University 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 University.

5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

* * * *
Academic Regulations (R13) for B. Tech.
(Lateral entry Scheme)

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

1. **Award of B. Tech. Degree**
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
   1.1 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.
   1.2 The candidate shall register for 132 credits and secure all the 132 credits.

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

3. **Promotion Rule**
   A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.
   A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 132 Credits from II year to IV year.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

## Disciplinary Action for / Improper Conduct in Examinations

<table>
<thead>
<tr>
<th>Nature of Malpractices / Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the candidate:</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1. (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the</td>
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<tr>
<td><strong>4.</strong></td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td></td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that</td>
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<tr>
<td><strong>Civil Engineering</strong></td>
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<tr>
<td><strong>Examination Rules</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td>2.</td>
<td>The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
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<tr>
<td>6.</td>
<td></td>
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<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall. Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
</tbody>
</table>
9. If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.

Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.

10. Comes in a drunken condition to the examination hall.

Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

11. Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.

Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.

12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.

**Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *
Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

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

<table>
<thead>
<tr>
<th>Act</th>
<th>Imprisonment upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing &amp; Humiliation</td>
<td>6 Months</td>
<td>Rs. 1,000/-</td>
</tr>
<tr>
<td>Assaulting or Using Criminal force or Criminal intimidation</td>
<td>1 Year</td>
<td>Rs. 2,000/-</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>2 Years</td>
<td>Rs. 5,000/-</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence</td>
<td>5 Years</td>
<td>Rs. 10,000/-</td>
</tr>
<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</td>
<td>Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
Ragging

ABSOLUTELY NOT TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded.
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
## COURSE STRUCTURE

### I Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – I</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics - I</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Chemistry</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Mechanics</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Studies</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Computer Programming</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Engineering Chemistry Laboratory</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>English – Communication Skills Lab - I</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>C Programming Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
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</tbody>
</table>

**Total Credits** 24

### I Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English - II</td>
<td>3+1*</td>
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<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics – II (Mathematical Methods)</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics – III</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Physics</td>
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<tr>
<td>5</td>
<td>Professional Ethics and Human Values</td>
<td>3+1*</td>
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<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Engineering Drawing</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>English-Communication Skills Lab - II</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Engineering Physics Laboratory</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Engineering Physics – Virtual Labs - Assignments</td>
<td>--</td>
<td>2</td>
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</tr>
<tr>
<td>10</td>
<td>Engineering Workshop &amp; IT Workshop</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits** 24

### II Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrical &amp; Electronics Engineering</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Probability &amp; Statistics</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Strength of Materials-I</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Building Materials and Construction</td>
<td>3+1*</td>
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<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Surveying</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Fluid Mechanics</td>
<td>3+1*</td>
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<tr>
<td>7</td>
<td>Surveying Field work-I</td>
<td>--</td>
<td>3</td>
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<tr>
<td>8</td>
<td>Strength of Materials Lab</td>
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**Total Credits** 22
## II Year – II SEMESTER

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<tbody>
<tr>
<td>1</td>
<td>Building Planning &amp; Drawing</td>
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<td>2</td>
<td>Managerial Economics and Financial Analysis</td>
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<td>3</td>
<td>Strength of Materials- II</td>
<td>3+1*</td>
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<tr>
<td>4</td>
<td>Hydraulics and Hydraulic Machinery</td>
<td>3+1*</td>
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<td>5</td>
<td>Concrete Technology</td>
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<td>6</td>
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<td>7</td>
<td>Fluid Mechanics and Hydraulic Machinery Lab</td>
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## III Year – I SEMESTER

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<tbody>
<tr>
<td>1</td>
<td>Engineering Geology</td>
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<td>2</td>
<td>Structural Analysis – II</td>
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<td>3</td>
<td>Design and Drawing of Reinforced Concrete Structures</td>
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<tr>
<td>4</td>
<td>Geotechnical Engineering – I</td>
<td>3+1*</td>
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<td>5</td>
<td>Transportation Engineering – I</td>
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## III Year – II SEMESTER

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<tbody>
<tr>
<td>1</td>
<td>Design and Drawing of Steel Structures</td>
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<td>Water Resources Engineering–I</td>
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<td>Computer Aided Engineering Drawing</td>
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<td>Transportation Engineering Lab</td>
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# IV Year – I SEMESTER

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<tbody>
<tr>
<td>1</td>
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<td>2</td>
<td>Prestressed Concrete</td>
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<td>3</td>
<td>Construction Technology and Management</td>
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<td>4</td>
<td>Water Resources Engineering–II</td>
<td>3+1*</td>
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<td>5</td>
<td>Remote Sensing and GIS Applications</td>
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<td>ELECTIVE - I</td>
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<td>GIS &amp; CAD Lab</td>
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**Total Credits** 22

# IV Year – II SEMESTER

<table>
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<tbody>
<tr>
<td>1</td>
<td>Estimating, Specifications &amp; Contracts</td>
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<td>ELECTIVE – III</td>
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<td>ELECTIVE – IV</td>
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<td>5</td>
<td>Project Work</td>
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</table>

**Total Credits** 21

**OPEN ELECTIVE:**
- a) Environmental Pollution and Control
- b) Disaster Management
- c) Industrial Water & Waste Water Management
- d) Architecture and Town Planning
- e) Finite Element Method
- f) Green Technologies

**Elective-I:**
- a) Ground Improvement Techniques
- b) Air Pollution and Control
- c) Matrix methods of Structural Analysis
- d) Urban Hydrology
- e) Advanced Surveying
- f) Interior Designs and Decorations
**Elective-II:**

a. Engineering with Geo-synthetics  
b. Environmental Impact Assessment and Management  
c. Advanced Structural Engineering  
d. Ground Water Development and Management  
e. Traffic Engineering  
f. Infrastructure Management  

**Elective-III:**

a) Advanced foundation Engineering  
b) Solid waste Management  
c) Earthquake Resistant Design  
d) Water Shed Management  
e) Pavement Analysis and Design  
f) Green Buildings  

**Elective-IV:**

a) Soil Dynamics and Machine Foundations  
b) Environmental and Industrial Hygiene  
c) Repair and Rehabilitation of Structures  
d) Water Resources System Planning and Management  
e) Urban Transportation Planning  
f) Safety Engineering  
g) Bridge Engineering
SYLLABUS

I Year – I SEMESTER

ENGLISH –I
(Common to All Branches)

DETAILED TEXT-I English Essentials : Recommended Topics :

1. IN LONDON: M.K.GANDHI
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME:** The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM
   **OBJECTIVE:** To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE
   **OBJECTIVE:** This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:
   **OBJECTIVE:** To inform the learners how to write clearly and logically.
   **OUTCOME:** The learner will be able to think clearly and logically and write clearly and logically.

5. MAN’S PERIL
   **OBJECTIVE:** To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS
   **OBJECTIVE:** This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   **OUTCOME:** This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.
7. **LUCK—MARK TWAIN**
   
   **OBJECTIVE:** This is a short story about a man’s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

   **OUTCOME:** The story is humorous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

   **Text Book:** ‘English Essentials’ by Ravindra Publications

   **NON-DETAILED TEXT:**

   *(From Modern Trailblazers of Orient Blackswan)*

   *(Common single Text book for two semesters)*

   *(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons))*

   1. **G.D.Naidu**
      
      **OBJECTIVE:** To inspire the learners by G.D.Naidu’s example of inventions and contributions.

      **OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

   2. **G.R.Gopinath**
      
      **OBJECTIVE:** To inspire the learners by his example of inventions.

      **OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

   3. **Sudhamurthy**
      
      **OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

      **OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

   4. **Vijay Bhatkar**
      
      **OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

      **OUTCOME:** The learner will emulate him and produce memorable things.

   **Text Book:** ‘Trail Blazers’ by Orient Black Swan Pvt. Ltd. Publishers
I Year – I SEMESTER

MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.
Applications: Newton’s Law of cooling-Law of natural growth and decay-
orthogonal trajectories.
Subject Category
ABET Learning Objectives  a  d  e
ABET internal assessments  1  2  6
JNTUK External Evaluation  A  B  E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with
RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax}V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion
Subject Category
ABET Learning Objectives  a  d  e
ABET internal assessments  1  2  6
JNTUK External Evaluation  A  B  E

UNIT III: Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of
derivatives and integrals – Unit step function –Dirac’s delta function- Inverse
Laplace transforms– Convolution theorem (with out proof).
Application: Solutions of ordinary differential equations using Laplace
transforms.
Subject Category
ABET Learning Objectives  a  e
ABET internal assessments  1  2  6
JNTUK External Evaluation  A  B  E

UNIT IV: 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.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

Subject Category
ABET Learning Objectives  a  c  e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

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

Subject Category
ABET Learning Objectives  a  e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

UNIT VI Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables
Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category
ABET Learning Objectives  a  e
ABET internal assessments  1 2 6
JNTUK External Evaluation  B  E

Books:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Theory Design</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>b) Design &amp; conduct experiment, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definition, Principle of operation or philosophy of concept.</td>
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<tr>
<td>Algorithms</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Drawing</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<tr>
<td>Others</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brainstorming questions</td>
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<td>h) Understand</td>
<td>8. Lab work or field work based</td>
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<td>impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
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<tr>
<td>i)</td>
<td>Recognize need for &amp; be able to engage in lifelong learning</td>
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<tr>
<td>j)</td>
<td>Know contemporary issues</td>
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<tr>
<td>k)</td>
<td>Use techniques, skills, modern tools for engineering practices</td>
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</table>
UNIT-I: WATER TECHNOLOGY
Hard Water – Estimation of hardness by EDTA method – Potable water- 
Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming 
and foaming , scale formation, corrosion, caustic embrittlement, turbine 
deposits – Softening of water – Lime soda, Zeolite processes – Reverse 
osmosis – Electro Dialysis, Ion exchange process
Objectives : For prospective engineers knowledge about water used in 
industries (boilers etc.) and for drinking purposes is useful; hence chemistry 
of hard water, boiler troubles and modern methods of softening hard water is 
introduced.

UNIT-II : ELECTROCHEMISTRY
Concept of Ionic conductance – Ionic Mobilities – Applications of 
Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode 
potentials – Nernst equation – Electrochemical series – Potentiometric 
titrations – Concentration cells – Ion selective electrode –Glass electrodes – 
Fluoride electrode; Batteries and Fuel cells.
Objectives : Knowledge of galvanic cells, electrode potentials, concentration 
cells is necessary for engineers to understand corrosion problem and its 
control ; also this knowledge helps in understanding modern bio-sensors, fuel 
cells and improve them.

UNIT-III : CORROSION
Causes and effects of corrosion – theories of corrosion (dry, chemical and 
electrochemical corrosion) – Factors affecting corrosion – Corrosion control 
methods – Cathodic protection –Sacrificial Anodic, Impressed current 
methods – Surface coatings – Methods of application on metals (Hot dipping, 
Galvanizing, tinning , Cladding, Electroplating, Electroless plating) – 
Organic surface coatings – Paints – Their constituents and their functions.
Objectives : the problems associated with corrosion are well known and the 
gineers must be aware of these problems and also how to counter them.

UNIT-IV : HIGH POLYMERS
Types of Polymerization – Stereo regular Polymers – Physical and 
Mechanical properties of polymers – Plastics – Thermoplastics and thermo 
setting plastics – Compounding and Fabrication of plastics – Preparation and

**Objectives:** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

**UNIT-V : FUELS**


**Objectives:** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

**UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS**


**Objectives:** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

**TEXT BOOKSS**


REFERENCES
OBJECTIVES: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I
OBJECTIVES: The students are to be exposed to the concepts of force and friction, direction and its application.

UNIT II
OBJECTIVES: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

UNIT – III
OBJECTIVES: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures.
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.
UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion


TEXT BOOKS:

REFERENCES:
Objectives: Formulating algorithmic solutions to problems and implementing algorithms in C

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts,
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling( gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-Darrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
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 for fibonacci series, towers of Hanoi, header
files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: 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 multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON.
3. Programming in C, A practical approach Ajay Mittal PEARSON.
4. The C programming Language by Dennis Richie and Brian Kernighan.

Reference Books:
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge
Course Learning Objectives:
The objectives of the course is to impart
1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties.

Course Outcomes:
The student should have knowledge on
1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:

UNIT - I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains,
ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources : World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources : Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources : Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.
Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - V

UNIT - VI

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi

Reference:
I Year – I SEMESTER

ENGINEERING CHEMISTRY LABORATORY

List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.
3. Estimation of KMnO₄ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K₂Cr₂O₇ solution.
5. Estimation of Copper using standard K₂Cr₂O₇ solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKSS

I Year – I SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – I

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

- **UNIT 1**
  - A. Greeting and Introductions
  - B. Pure Vowels

- **UNIT 2**
  - A. Asking for information and Requests
  - B. Diphthongs

- **UNIT 3**
  - A. Invitations
  - B. Consonants

- **UNIT 4**
  - A. Commands and Instructions
  - B. Accent and Rhythm

- **UNIT 5**
  - A. Suggestions and Opinions
  - B. Intonation

**Text Book:**

‘Strengthen your Communication Skills’ Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications).
I Year – I SEMESTER

C PROGRAMMING LAB

Exercise 1
a) Write a C Program to calculate the area of triangle using the formula
   \[ \text{area} = \left( \frac{s}{2} \right)\sqrt{(s-a)(s-b)(s-c)} \]
   where \( s = \frac{(a+b+c)}{2} \)
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2
a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement).

Exercise 3
a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4
a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.
Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a linear search.
c) Write a C program to implement binary search.

Exercise 6
a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 7
Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string into a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.
   iii. To replace a character of string either from beginning or ending or at a specified location.

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:
   i) Reading a complex number ii) Writing a complex number
   iii) Addition of two complex numbers iv) Multiplication of two complex numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions
   - to concatenate two strings
   - to append a string to another string
   - to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions
   - to find the length of a string
   - to find whether a given string is palindrome or not
Exercise 11
a) Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference concepts.

Exercise 12
Write C programs that use both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To find Fibonacci sequence

Exercise 13
a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

Exercise 14
a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers

Exercise 15
Examples which explores the use of structures, union and other user defined variables.

Exercise 16
a) Write a C program which copies one file to another.

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

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.
I Year – II SEMESTER

ENGLISH –II
(Common to All Branches)

DETAILED TEXT-II :Sure Outcomes: English for Engineers and Technologists

Recommended Topics :

1. TECHNOLOGY WITH A HUMAN FACE
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME:** The proposed technology is people’s technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
   **OBJECTIVE:** To make the learner understand how the unequal heating of earth’s surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME:** The learner’s understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
   **OBJECTIVE:** To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME:** The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
   **OBJECTIVE:** To inform the learner of the various advantages and characteristics of water.
   **OUTCOME:** The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
   **OBJECTIVE:** In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME:** The students will learn to work hard with devotion and dedication.

6. WORK BRINGS SOLACE
   **OBJECTIVE:** In this lesson Abdul Kalam highlights the advantage of work.
   **OUTCOME:** The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. J.C. Bose
   OBJECTIVE: To apprise of J.C.Bose’s original contributions.
   OUTCOME: The learner will be inspired by Bose’s achievements so that he may start his own original work.

2. Homi Jehangir Bhaba
   OBJECTIVE: To show Bhabha as the originator of nuclear experiments in India.
   OUTCOME: The learner will be inspired by Bhabha’s achievements so as to make his own experiments.

3. Vikram Sarabhai
   OBJECTIVE: To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   OUTCOME: The learner will realize that development is impossible without scientific research.

   OBJECTIVE: To expose the reader to the pleasure of the humorous story.
   OUTCOME: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

I Year – II SEMESTER

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT II Interpolation:

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Numerical solution of Ordinary Differential equations:
Solution by Taylor’s series-Picard’s Method of successive Approximations- Euler’s Method-Runge-Kutta Methods

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series application: Amplitude, spectrum of a periodic function

Subject Category.
UNIT V Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT VI Z-transform:
Introduction – properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z - transforms.

BOOKS:
2. DEAN G. DUFFY, Advanced Engineering Mathematics with MATLAB, CRC Press
3. V.RAVINDRANATH and P. VIJAYALAXMI, Mathematical Methods, Himalaya Publishing House
<table>
<thead>
<tr>
<th>Theory</th>
<th>Design</th>
<th>Analysis</th>
<th>Algorithms</th>
<th>Drawing</th>
<th>Others</th>
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<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints.</td>
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<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context.</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning.</td>
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<td>3. Peer tutoring based.</td>
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<td>4. Simulation based.</td>
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<td>5. Design oriented.</td>
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<td>7. Experiential (project based).</td>
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<td>8. Lab work or field work based.</td>
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<td>13. Philosophy of concept.</td>
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<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<td>D. Design oriented problems.</td>
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<td>E. Trouble shooting type of questions.</td>
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<td>F. Applications related questions.</td>
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<td>G. Brain storming questions.</td>
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philosophy of concept.
UNIT I Linear systems of equations:
Application: Finding the current in a electrical circuit.

Subject Category
ABET Learning Objectives   a e k
ABET internal assessments   1 2 6 4
JNTUK External Evaluation  A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Application: Free vibration of a two-mass system.

Subject Category
ABET Learning Objectives   a d e k
ABET internal assessments   1 2 4 6
JNTUK External Evaluation  A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing ( Cartesian - Polar and Parametric curves)-
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.
Application: Moments of inertia

Subject Category
ABET Learning Objectives   a e d
ABET internal assessments   1 2 6
JNTUK External Evaluation  A B E
UNIT IV Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Vector Integration:
Application: work done, Force
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

BOOKS:
<table>
<thead>
<tr>
<th>Subject Category</th>
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<th>Remarks</th>
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<tr>
<td>Theory Design Analysis Algorithm Drawing Others</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
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<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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I Year – II SEMESTER

ENGINEERING PHYSICS

UNIT-I
PHYSICAL OPTICS FOR INSTRUMENTS
“Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics”


UNIT-II
COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS
Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.


X-RAY DIFFRACTION TECHNIQUES : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg’s law.

UNIT-III
MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY
“Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

**MAGNETIC PROPERTIES** : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve.


**SUPERCONDUCTIVITY** : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London’s equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

**UNIT – IV**

**ACOUSTICS AND EM – FIELDS:**

**Objective:** The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

**ACOUSTICS:** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

**ELECTRO-MAGNETIC FIELDS:** Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations (Calculus approach).

**UNIT – V**

**QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT**

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

**QUANTUM MECHANICS:** Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

**FREE ELECTRON THEORY:** Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.

**BAND THEORY OF SOLIDS:** Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of
materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

UNIT – VI
SEMICONDUCTOR PHYSICS:
Objective: In the wake of ever increasing demand for the space and power the watch word “small is beautiful”, understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.


TEXT BOOKS
1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers).

REFERENCE BOOKS
1. ‘Introduction to solid state physics’ by Charles Kittle (Willey India Pvt.Ltd)
2. ‘Applied Physics’ by T. Bhimasenkaram (BSP BH Publications )
3. ‘Applied Physics’ by M.Arumugam (Anuradha Agencies)
4. ‘Engineering Physics’ by Palanisamy (Scitech Publishers )
5. ‘Engineering Physics’ by D.K.Bhattacharya ( Oxford University press).
7. ‘Engineering Physics’ by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
UNIT I: Human Values:

UNIT II: Engineering Ethics:

UNIT III: Engineering as Social Experimentation:

UNIT IV: Engineers’ Responsibility for Safety and Risk:

UNIT V: Engineers’ Responsibilities and Rights:
UNIT VI : Global Issues:

********

Text Books:
4. “Professional Ethics and Human Values” by Prof. D.R. Kiran-
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication.
Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them. Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other. Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes. Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective : The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications

REFERENCE BOOKS:
ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6  Body language
UNIT 7  Dialogues
UNIT 8  Interviews and Telephonic Interviews
UNIT 9  Group Discussions
UNIT 10 Presentation Skills
UNIT 11 Debates

Text Book:

‘Strengthen your Communication Skills’ Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications).
List of Experiments

3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of stretched string – Sonometer.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect for semiconductor.

REFERENCE:
I Year – II SEMESTER

Engineering Physics
Virtual Labs - Assignments

List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in
ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP:
Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

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

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

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

**Productivity tools** Crafting professional word documents; excel spreadsheets, power point presentations and personal web sites using the Microsoft suite of office tools.

*(Note: Student should be thoroughly exposed to minimum of 12 Tasks)*

**PC Hardware**

**Task 1:** Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

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

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

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

**Task 5:**

**Hardware Troubleshooting (Demonstration):**
Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

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

**Internet & Networking Infrastructure**

**Task 6:** Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

**Orientation & Connectivity Boot Camp and web browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7:** Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.
**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9 : MS Word Orientation:**
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10: Creating project:** Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.**

**Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.**

**Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter,**
notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOK:
Faculty to consolidate the workshop manuals using the following references
3. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.

REFERENCE BOOK:
1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.
2. PC Hardware trouble shooting made easy, TMH.
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

i. To learn the basic principles of electrical law’s and analysis of networks.

ii. To understand the principle of operation and construction details of DC machines.

iii. To understand the principle of operation and construction details of transformer.

iv. To understand the principle of operation and construction details of alternator and 3-Phase induction motor.

v. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.

vi. To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I
ELECTRICAL CIRCUITS: Basic definitions, Types of network elements, Ohm’s Law, Kirchhoff’s Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT - II
DC MACHINES: Principle of operation of DC generator – emf equation - types – DC motor types –torque equation – applications – three point starter, swinburn’s Test, speed control methods.

UNIT - III
TRANSFORMERS: Principle of operation of single phase transformers – e.m.f equation – losses – efficiency and regulation.

UNIT - IV
UNIT V
RECTIFIERS & LINEAR ICs: PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non inverting, integrator and differentiator).

UNIT VI
TRANSISTORS: PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Outcomes:

i. Able to analyse the various electrical networks.

ii. Able to understand the operation of DC generators, 3-point starter and conduct the Swinburne’s Test.

iii. Able to analyse the performance of transformer.

iv. Able to explain the operation of 3-phase alternator and 3-phase induction motors.

v. Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.

vi. Able to explain the single stage CE amplifier and concept of feedback amplifier.

TEXT BOOKS:


3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

REFERENCE BOOKS:


4. Industrial Electronics by G.K. Mittal, PHI.
II Year – I SEMESTER

PROBABILITY AND STATISTICS
(Common to CE, CSE, IT, Chemical, PE, PCE, Civil Branches)

UNIT I Random variables and Distributions:
Introduction- Random variables- Distribution function- Discrete distributions
(Review of Binomial and Poisson distributions)
Continuous distributions: Normal, Normal approximation to Binomial distribution, Gamma and Weibull distributions.

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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

Subject Category
ABET Learning Objectives   a b d e h k
ABET internal assessments   1 2 6 7 10
JNTUK External Evaluation   A B D E F

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

Subject Category
ABET Learning Objectives   a d e h k
ABET internal assessments   1 2 6 10
JNTUK External Evaluation   A B E

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

Subject Category
ABET Learning Objectives   a e k
ABET internal assessments   1 2 6
JNTUK External Evaluation   A B E F

Books:
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<th>Subject Category</th>
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<tr>
<td>Theory Design Analysis Algorithms Drawing Others</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
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<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
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<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<td>h) Understand impact of engineering solutions in global,</td>
<td>8. Lab work or field work based</td>
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<td>9. Presentation based</td>
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<td>10. Case Studies based</td>
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<td>11. Role-play based</td>
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<td>Recognize need for &amp; be able to engage in lifelong learning</td>
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<td>Know contemporary issues</td>
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<td>k)</td>
<td>Use techniques, skills, modern tools for engineering practices</td>
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II Year – I SEMESTER  

STRENGTH OF MATERIALS-I

Course Learning Objectives:

1. To give preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations.

2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.

3. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.

4. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.

5. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.

2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.

3. The student will have knowledge of bending concepts and calculation of section modulus and for determination of stressed developed in the beams due to various loading conditions.

4. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure.

Syllabus:

UNIT – I: SIMPLE STRESSES AND STRAINS and STRAIN ENERGY: Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of
safety – Lateral strain, Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**STRAIN ENERGY** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

**UNIT – II:**

**SHEAR FORCE AND BENDING MOMENT:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III:**


**UNIT – IV:**

**SHEAR STRESSES:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

**UNIT – V:**

**DEFLECTION OF BEAMS:** Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

**UNIT – VI:**

**THIN AND THICK CYLINDERS:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

**THICK CYLINDERS:** Introduction Lame’s theory for thick cylinders – Derivation of Lame’s formulae – distribution of hoop and radial stresses.
across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

TEXT BOOKS:
Strength of Materials by S. S. Bhavakatti

REFERENCES:
2. Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi

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II Year – I SEMESTER

BUILDING MATERIALS AND CONSTRUCTION

UNIT. I: STONES, BRICKS AND TILES


UNIT. II: MASONRY

Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.


UNIT. III: LIME AND CEMENT


UNIT. IV: BUILDING COMPONENTS

Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT. V: FINISHINGS

Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering –
Form Works and Scaffoldings.
UNIT. VI: AGGREGATES

Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

TEXT BOOKS:


References:

2. Building Materials by P.C.Verghese, PHI learning (P) ltd.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.
Course Learning Objectives:

To introduce the students to basic principles of surveying, various methods of linear and angles measuring instruments and enable the students to use surveying equipments.

Course Outcomes:

Upon successful completion of the course, the student will be able:

- To demonstrate the basic surveying skills
- To use various surveying instruments.
- To perform different methods of surveying
- To compute various data required for various methods of surveying.
- To integrate the knowledge and produce topographical map.

Syllabus:

UNIT – I
INTRODUCTION: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II
DISTANCES AND DIRECTION: Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements (EDM)- principles of of electro optical EDM-errors and corrections to linear measurements - compass survey - Meridians, Azimuths and Bearings, declination, computation of angle. Traversing - Purpose-types of traverse-traverse computation - traverse adjustments - omitted measurements.

UNIT – III
UNIT – IV
TACHEOMETRIC SURVEYING: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT – V
Curves: Types of curves, design and setting out – simple and compound curves- transition curves. Introduction to geodetic surveying, Total Station and Global positioning system.

UNIT – VI
COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text books:
1. Surveying (Vol No.1, 2 &3 ) by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P)ltd, New Delhi.
3. Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
4. Surveying and levelling by R. Subramanian, Oxford University press.

References:
3. Higher Surveying by A.M. Chandra, New Age International Pvt ltd.
II Year – I SEMESTER

FLUID MECHANICS

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
HYDROSTATICS: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

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, three dimensional flows – stream and velocity potential functions, flow net analysis.

UNIT III
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 IV
BOUNDARY LAYER THEORY: Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, no deviations BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT V
LAMINAR FLOW: Reynold’s experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy’s equation, Minor losses – pipes in series – pipes in parallel – Total energy line and
hydraulic gradient line. Pipe network problems, variation of friction factor with Reynolds's number – Moody’s Chart.

UNIT – VI
MEASUREMENT OF FLOW: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and Stepped notches – Broad crested weirs.

TEXT BOOKS:
1. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.
3. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

REFERENCES:
1. Fluid Mechanics by Merie C. Potter and David C. Wiggert, Cengage learning
2. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi

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III Year – I SEMESTER

SURVEYING FIELD WORK-I

List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed circuit).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse).
5. Plane table survey: finding the area of a given boundary by the method of Radiation.
6. Plane table survey: finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
11. Fly levelling: Longitudinal Section and Cross sections of a given road profile.

Note: Any 10 field work assignments must be completed.
II Year – I SEMESTER  
STRENGTH OF MATERIALS LAB

List of Experiments
1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges

List of Major Equipment:
1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell’s / Rock well’s hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell’s theorem verification.
11. Continuous beam setup

***
UNIT. I:
BUILDING BYELAWS AND REGULATIONS
Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT. II:
RESIDENTIAL BUILDINGS
Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types residential buildings.

UNIT. III:
PUBLIC BUILDINGS
Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT.IV :
SIGN CONVENTIONS AND BONDS
Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.

English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT.V:
DOORS, WINDOWS, VENTILATORS AND ROOFS
Panelled door, panelled and glassed door, glassed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs.

King Post truss, Queen Post truss
Sloped and flat roof buildings : drawing plans, Elevations and Cross Sections of given sloped roof buildings.
UNIT. VI:
PLANNING AND DESIGNING OF BUILDINGS
Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

TEXT BOOKS:
1. Planning and Design of buildings by Y.S. Sane
2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
4. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur,

REFERENCES:
1. Building drawing by Shah and Kale

INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.
II Year – II SEMESTER

T P C
3+1 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand).

Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III: (*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)

Introduction to Markets, Theories of the Firm & Pricing Policies:
(** One has to understand the nature of different markets and Price Output determination under various market conditions).
Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)

Types of Business Organization and Business Cycles:

(*One should equipped with the knowledge of different Business Units)

Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)

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

(*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

Unit – VI: (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods).


(*The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making).

Note: *Learning Objective
** Learning Assessment

TEXT BOOKS
REFERENCES:
1. V. Maheswari : Managerial Economics, Sultan Chand.
II Year – II SEMESTER

STRENGTH OF MATERIALS- II

Course Learning Objectives:
1. To give preliminary concepts of Principal stresses and strains developed in cross section of the beams analytically as well as graphically due to stresses acting on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories.
2. To give concepts of torsion and governing torsion equation, and thereby calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
3. To classify columns and calculation of load carrying capacity using different empirical formulas and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses with different engineering structures.
4. Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.
5. Impart concepts for determination of Forces in members of plane, pin-jointed, perfect trusses by different methods.

Course Outcomes:
Upon successful completion of this course
1. The student will be able to understand the basic concepts of Principal stresses developed when subjected to stresses along different axes and design the sections.
2. The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions.
3. The student will be able to assess forces in different types of trusses used in construction.

Syllabus:

UNIT- I
PRINCIPAL STRESSES AND STRAINS AND THEORY OF FAILURES: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses
accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

**THEORIES OF FAILURES:** Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

**UNIT – II**

**TORSION OF CIRCULAR SHAFTS AND SPRINGS:** Theory of pure torsion – Derivation of Torsion equations: \( T/J = q/r = N\phi/L \) – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

**SPRINGS:** Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

**UNIT – III**


Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

**UNIT – IV**

**DIRECT AND BENDING STRESSES:** Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

**UNIT – V**

**UNSYMETRICAL BENDING:** Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.
UNIT – VI
ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

TEXTBOOKS:
2. Strength of materials by S. S. Bhavakatti

REFERENCES:

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II Year – II SEMESTER

HYDRAULICS AND HYDRAULIC MACHINERY

UNIT – I
OPEN CHANNEL FLOW: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy’s, Manning’s; and Bazin formulae for uniform flow – Most Economical sections.

UNIT II
OPEN CHANNEL FLOW II: Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III
HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV
BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines.

UNIT – V
HYDRAULIC TURBINES – I: Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.
HYDRAULIC TURBINES – II: Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.
UNIT – VI

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps.

TEXT BOOKS:

REFERENCES:
1. Fluid mechanics and fluid machines by Rajput, S. Chand & Co.
Course Learning Objectives:

- To learn the concepts of Concrete production and its behaviour in various environments.
- To learn the test procedures for the determination of properties of concrete.
- To understand durability properties of concrete in various environments.

Course Outcomes:
Upon successful completion of this course, student will be able to

- understand the basic concepts of concrete.
- realise the importance of quality of concrete.
- familiarise the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
- test the fresh concrete properties and the hardened concrete properties.
- evaluate the ingredients of concrete through lab test results.
- design the concrete mix by BIS method.
- familiarise the basic concepts of special concrete and their production and applications.
- understand the behaviour of concrete in various environments.

Syllabus:

UNIT I: INGREDIENTS OF CONCRETE
AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis –
Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size.

Quality of mixing water

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI
TEXT BOOKS:

REFERENCES:
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.
II Year – II SEMESTER

STRUCTURAL ANALYSIS - I

Course Learning Objectives:
1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
4. The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans are passing over beams of different spans of Pratt and Warren trusses.

Course Outcomes:
Upon successful completion of this course,
1. The student will be able to estimate the bending moment and shear forces in beams of different fixity conditions.
2. The student can analyze the continuous beams using tan important method of slope deflection which impart basic concepts for other methods of analysis to be discussed in next level analysis course.
3. The student will be able to analyze the loads in Pratt and Warren trusses when loads of different types and spans were passing over the truss. These concepts will be used in to understand the performance and to design of bridge structures in next level courses.

Syllabus:

UNIT – I
PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II
FIXED BEAMS – Introduction to statically indeterminate beams with U. D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.
UNIT – III
CONTINUOUS BEAMS: Introduction-Clapeyron’s theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV
SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V
ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano’s first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI
MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

TEXT BOOKS:

REFERENCES:
List of Experiments
1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli’s equation.
7. Impact of jet on vanes
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

List of Equipment:
1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli’s theorem setup.
8. Impact of jets.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.
II Year – II SEMESTER

CONCRETE TECHNOLOGY LAB

Course Learning Objectives:
To test the basic properties ingredients of concrete, fresh and hardened concrete properties.

Course Outcomes:
Upon successful completion of this course, student will be able to

- Determine the consistency and fineness of cement.
- Determine the setting times of cement.
- Determine the specific gravity and soundness of cement.
- Determine the compressive strength of cement.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests.
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete.

List of Experiments:
At least 10 experiments must be conducted (at least one for each property)
1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
10. Determination of workability of concrete by slump test
14. Non-Destructive testing on concrete (for demonstration)

**List of Equipment:**
1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat’s apparatus
3. Specific gravity bottle.
4. Lechatlier’s apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.
7. Vee- Bee test apparatus
8. Longitudinal compresso meter
10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc.
List of Experiments

2. Theodolite Survey: Finding the distance between two inaccessible points.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station: Traversing
10. Total Station: Contouring
11. Total Station: Determination of Remote height.
12. Total Station: distance between two inaccessible points.

**Note:** Any 10 field work assignments must be completed.
Course Learning Objectives:
The objective of this course is:

1. To introduce the Engineering Geology as a subject in Civil Engineering.
2. To enable the student to use subject in civil engineering applications.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Identify and classify the geological minerals.
b. Measure the rock strengths of various rocks.
c. Classify and measure the earthquake prone areas to practice the hazard zonation.
d. Classify, monitor and measure the Landslides and subsidence.
e. Prepares, analyses and interprets the Engineering Geologic maps.
f. Analyses the ground conditions through geophysical surveys.
g. Test the geological material and ground to check the suitability of civil engineering project construction.
h. Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…

SYLLABUS:

UNIT-I:
Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.
**Weathering:** Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

**UNIT-II**

**Mineralogy And Petrology:** Definitions of mineral and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

**UNIT-III**

**Structural Geology:** Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

**UNIT-IV**

**Ground Water:** Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

**Earthquakes And Land Slides:** Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Land slides.

**UNIT-V**

**Geophysics:** Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

**UNIT-VI**

**Geology Of Dams, Reservoirs And Tunnels:** Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.
TEXT BOOKS:

1. ‘Engineering Geology’ by Subinoy Gangopadhay, Oxford University press.

REFERENCES:

1. ‘Engineering Geology for Civil Engineers’ by P.C. Varghese, PHI Learning Pvt. Ltd.
2. ‘Geology for Engineers and Environmental Society’ by Alan E Kehew, Person Publications, 3rd edition
4. ‘Engineering Geology’ by V. Parthesarathi et al., Wiley Publications

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III Year – I SEMESTER

CE502 - STRUCTURAL ANALYSIS – II

Lecture : 3 hrs/Week    Internal Assessment : Marks
Tutorial : 1 Hrs/Week   Semester End Examination : Marks
Practical : --            Credits : 3

Course Learning Objectives:
The objective of this course is:
1. Familiarize Students with Different types of Structures
2. Equip student with concepts of Arches
3. Understand Concepts of lateral Load analysis
4. Familiarize Cables and Suspension Bridges
5. Understand Analysis methods Moment Distribution, Kanis Method and Matrix methods.

Course Outcomes:
At the end of this course; the student will be able to
a. Differentiate Determinate and Indeterminate Structures
b. Carryout lateral Load analysis of structures
c. Analyze Cable and Suspension Bridge structures
d. Analyze structures using Moment Distribution, Kani’s Method and Matrix methods.

SYLLABUS:

UNIT I

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – ( No analytical question).

UNIT-II
UNIT – III
Cable Structures And Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV

UNIT – V
Kani’s Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNI – VI
Introduction to Matrix Methods:
Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.
Stiffness method: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

TEXT BOOKS:
2. ‘Structural Analysis’ by R.C. Hibbeler, Pearson Education, India

REFERENCES:
2. ‘Theory of structures’ by Ramamuratam, Dhanpatrai Publications.

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Course Learning Objectives:
The objective of this course is:
1. Familiarize Students with different types of design philosophies
2. Equip student with concepts of design of flexural members
3. Understand Concepts of shear, bond and torsion
4. Familiarize students with different types of compressions members and Design
5. Understand different types of footings and their design

Course Outcomes:
At the end of this course the student will be able to
a. Work on different types of design philosophies
b. Carryout analysis and design of flexural members and detailing
c. Design structures subjected to shear, bond and torsion
d. Design different type of compression members and footings

SYLLABUS:

UNIT – I

UNIT –II

UNIT – III
Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability: Deflection, cracking and code provision, Design of formwork for beams and slabs.

UNIT – IV
Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

UNIT – V
Footings: Different types of footings – Design of isolated and combined footings - rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

UNIT – VI
Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to be taught in Limit State Method
Following plates should be prepared by the students.
1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks
FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:
1. ‘Limit State Design’ by A. K. Jain
2. ‘Design of Reinforced concrete Structures’ by N. Subrahmanyian

REFERENCES:
2. ‘Reinforced Concrete Structures’ by Park and Pauley, John Wiley and Sons.

IS Codes:
1) IS -456-2000 (Permitted to use in examination hall)
2) IS – 875
3) SP-16

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Course Learning Objectives:
The objective of this course is:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes:
Upon the successful completion of this course
a. The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
b. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
c. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
d. The student should be able to apply the above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I
UNIT – II

UNIT – III

UNIT – IV
Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq’s and Westergaard’s theories for point loads and areas of different shapes– Newmark’s influence chart – 2:1 stress distribution method.

UNIT – V
Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi’s theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT - VI

TEXT BOOKS:
3. ‘Soil Mechanics’ by M.Palani Kumar, PHI Learning.

REFERENCES:
2. ‘An introduction to Geotechnical Engineering’ by Holtz and Kovacs; Prentice Hall.

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Course Learning Objectives:
The objective of this course is:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To learn various highway construction and maintenance procedures.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Plan highway network for a given area.
b. Determine Highway alignment and design highway geometrics.
c. Design Intersections and prepare traffic management plans.
d. Judge suitability of pavement materials and design flexible and rigid pavements.
e. Construct and maintain highways

SYLLABUS:

UNIT I
Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT II
Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements -Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of

UNIT – III

Traffic Engineering: Basic Parameters of Traffic - Volume, Speed and Density- Traffic Volume Studies; Speed studies – spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method – IRC Method.

UNIT – IV


UNIT – V

Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors  

UNIT – VI

Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements.
TEXT BOOKS:

REFERENCES:
5. ‘Principles of Transportation Engineering’ by Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi

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III Year – I Semester

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I

Unit II

Unit III

Unit IV

Unit V
Unit VI

REFERENCE BOOKS:
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
Course Learning Objectives:
The objective of this course is:
1. To impart knowledge of determination of index properties required for classification of soils.
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
3. To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:
Upon successful completion of this course, student will be able to
a. Determine index properties of soil and classify them.
b. Determine permeability of soils.
c. Determine Compaction, Consolidation and shear strength characteristics.

SYLLABUS:
LIST OF EXPERIMENTS
1. Specific gravity, G
2. Atterberg’s Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

At least Ten experiments shall be conducted.

**LIST OF EQUIPMENT:**
1. Casagrande’s liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75 mm, 2 mm, 1 mm, 0.6 mm, 0.42 mm, 0.3 mm, 0.15 mm, and 0.075 mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 50\(^0\) - 150\(^0\)C

**Reference:**
2. IS Code 2720 – relevant parts.
Course Learning Objectives:
The objective of this course is:

1. To identify the mega-scopic types of Ore minerals & Rock forming minerals.
2. To identify the mega-scopic types of Igneous, Sedimentary, Metamorphic rocks.
3. To identify the topography of the site & material selection

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Identify Mega-scopic minerals & their properties.
b. Identify Mega-scopic rocks & their properties.
c. Identify the site parameters such as contour, slope & aspect for topography.
d. Know the occurrence of materials using the strike & dip problems.

SYLLABUS:
LIST OF EXPERIMENTS
1. Physical properties of minerals: Mega-scopic identification of
   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglomorate, etc…
c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc…

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.


5. Bore hole data.

6. Strength of the rock using laboratory tests.


LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

REFERENCE:


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III Year – II SEMESTER

CE601-DESIGN AND DRAWING OF STEEL STRUCTURES

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is to:
1. Familiarize Students with different types of Connections and relevant IS codes
2. Equip student with concepts of design of flexural members
3. Understand Design Concepts of tension and compression members in trusses
4. Familiarize students with different types of Columns and column bases and their Design
5. Familiarize students with Plate girder and Gantry Girder and their Design

Course Outcomes:
At the end of this course the student will be able to
a. Work with relevant IS codes.
b. Carryout analysis and design of flexural members and detailing.
c. Design compression members of different types with connection detailing.
d. Design Plate Girder and Gantry Girder with connection detailing
e. Produce the drawings pertaining to different components of steel structures.

SYLLABUS:

UNIT – I
UNIT – II

**Beams:** Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III

**Tension Members and compression members:** General Design of members subjected to direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.**Roof Trusses:** Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of simple roof trusses involving the design of purlins, members and joints – tubular trusses.

UNIT – IV

**Design of Columns:** Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

UNIT – V

**Design of Column Foundations:** Design of slab base and gusseted base. Column bases subjected moment.

UNIT – VI

**Design of Plate Girder:** Design consideration – IS Code recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.  
**Design of Gantry Girder:** impact factors - longitudinal forces, Design of Gantry girders.

**NOTE:** Welding connections should be used in Units II – VI. 

The students should prepare the following plates.

- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flange plates.
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.
INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS
1. ‘Steel Structures Design and Practice’ by N.Subramanian, Oxford University Press.
2. ‘Design of Steel Structures’ by Ramachandra, Vol – 1, Universities Press.
3. ‘Design of steel structures’ by S.K. Duggal, Tata Mcgraw Hill, and New Delhi

REFERENCES
1. ‘Structural Design in Steel’ by Sarwar Alam Raz, New Age International Publishers, New Delhi
2. ‘Design of Steel Structures’ by P. Dayaratnam; S. Chand Publishers
3. ‘Design of Steel Structures’ by M. Raghupathi, Tata Mc. Graw-Hill
4. ‘Structural Design and Drawing’ by N. Krishna Raju; University Press,

IS Codes:
1) IS -800 – 2007
2) IS – 875
3) Steel Tables.
These codes and steel tables are permitted to use in the examinations.

***
Course Learning Objectives:
The objective of this course is:
1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:
Upon the successful completion of this course:

a. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.

b. The student must be able to compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.

c. The student must be able to use the field test data and arrive at the bearing capacity.

d. The student must be able to apply the principles of bearing capacity of piles and design them accordingly.

SYLLABUS:

UNIT – I

UNIT – II
Earth And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability
analysis by Swedish arc method, standard method of slices – Taylor’s Stability Number-Stability of slopes of dams and embankments - different conditions.
Rankine’s & Coulomb’s theory of earth pressure – Culmann’s graphical method - earth pressures in layered soils.

UNIT-III
Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi’s theory - IS Methods.

UNIT-IV
Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT-V
Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-VI

TEXT BOOKS:

REFERENCES:
Course Learning Objectives:
The objective of this course is:
1. To know various components and their functions in a railway track
2. To acquire design principles of geometrics in a railway track.
3. To know various techniques for the effective movement of trains.
4. To acquire design principles of airport geometrics and pavements.
5. To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes:
At the end of course, Student can
   a. Design geometrics in a railway track.
   b. Provide good transportation network
   c. Design airport geometrics and airfield pavements.
   d. Plan, construct and maintain Docks and Harbours.

SYLLABUS:
A. RAILWAY ENGINEERING

UNIT – I
Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast – Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.

UNIT – II

UNIT – III


B.AIRPORT ENGINEERING

UNIT – IV

**Airport Planning & Design:** Airport Master plan – Airport site selection – Aircraft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

UNIT – V


C.DOCKS & HARBOURS

UNIT – VI


TEXT BOOKS:

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi

REFERENCES:


4. ‘Transportation Engineering’ by Srinivasa Kumar R, University Press, Hyderabad


***
Course Learning Objectives:
The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city.
2. Provide knowledge of water quality requirement for domestic usage
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems.
5. Impart knowledge on design of water distribution network.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Plan and design the water and distribution networks and sewerage systems.

b. Identify the water source and select proper intake structure.

c. Characterisation of water.

d. Select the appropriate appurtenances in the water supply.

e. Selection of suitable treatment flow for raw water treatments.

SYLLABUS:

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.
UNIT-II

**Sources of Water**: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

**Collection and Conveyance of Water**: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipe lines.

UNIT-III

**Quality and Analysis of Water**: Characteristics of water–Physical, Chemical and Biological–Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT-IV

**Treatment of Water**: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration.

UNIT-V


UNIT-VI

**Distribution of Water**: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, and water meters–Laying and testing of pipe lines- selection of pipe materials, pipe joints.

**TEXT BOOKS**


REFERENCES
3. Water Supply Engineering – Dr. P.N. Modi

***
III Year – II SEMESTER

CE603-WATER RESOURCES ENGINEERING–I

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Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The course is designed to

1. Introduce hydrologic cycle and its relevance to Civil engineering.
2. Make the students understand physical processes in hydrology and, components of the hydrologic cycle.
3. Appreciate concepts and theory of physical processes and interactions.
4. Learn measurement and estimation of the components hydrologic cycle.
5. Provide an overview and understanding of Unit Hydrograph theory and its analysis.
6. Understand flood frequency analysis, design flood, flood routing.
7. Appreciate the concepts of groundwater movement and well hydraulics.

Course Outcomes
At the end of the course the students are expected to

a. Have a thorough understanding of the theories and principles governing the hydrologic processes.
b. Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
c. Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
d. Be able to develop design storms and carry out frequency analysis.
e. Be able to determine storage capacity and life of reservoirs.
f. Develop unit hydrograph and synthetic hydrograph.
g. Be able to estimate flood magnitude and carry out flood routing.
h. Be able to determine aquifer parameters and yield of wells.
i. Be able to model hydrologic processes.
SYLLABUS:

UNIT I
Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.
Precipitation: Types and forms, measurement, raingauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II
Abstractions from Precipitation: Initial abstractions.
Evaporation: factors affecting, measurement, reduction
Evapotranspiration: factors affecting, measurement, control
Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-III
Runoff: Catchment characteristics, Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.
Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT-IV
Floods: Causes and effects, frequency analysis- Gumbel’s and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.
Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT-V
Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy’s law, Dupuit’s equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.
UNIT VI
Advanced Topics in Hydrology: Rainfall-runoff Modelling, instantaneous unit hydrograph (IUH) - conceptual models - Clark and Nash models, general hydrological models - Chow - Kulandaiswamy model.

TEXT BOOKS:

REFERENCES:

***
III Year – II SEMESTER

CE606 (a) - ENVIRONMENTAL POLLUTION AND CONTROL

Lecture: 3 hrs/Week  Internal Assessment: Marks
Tutorial: 1 Hrs/Week  Semester End Examination: Marks
Practical: -- Credits: 3

Course Learning Objectives:
The objective of this course is:

1. Impart knowledge on fundamental aspects of air pollution & control, noise pollution, and solid waste management.
2. Provide basic knowledge on sustainable development.
3. Introduces some basics of sanitation methods essential for protection of community health.
4. Differentiate the solid and hazardous waste based on characterization.

Course Learning Outcomes:
By the end of successful completion of this course, the students will be able to:

a. Identify the air pollutant control devices
b. Have knowledge on the NAAQ standards and air emission standards
c. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
d. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
e. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
f. Appreciate the importance of sustainable development while planning a project or executing an activity.

SYLLABUS:

UNIT – I
Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.
**Noise Pollution:** Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

**UNIT –II**  

**UNIT – III**  
**Solid Waste Management:** solid waste characteristics – basics of on-site handling and collection – separation and processing - Incineration-Composting-Solid waste disposal methods – fundamentals of Land filling.

**UNIT – IV**  
**Environmental Sanitation:** Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

**UNIT – V**  
**Hazardous Waste:** Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

**UNIT- VI**  
**Sustainable Development:** Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

**TEXT BOOKS:**

REFERENCES:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.

***
CE606 (b) - DISASTER MANAGEMENT
(Open Elective)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the ‘relief system’ and the ‘disaster victim.’
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Affirm the usefulness of integrating management principles in disaster mitigation work
b. Distinguish between the different approaches needed to manage pre- during and post- disaster periods
c. Explain the process of risk management
d. Relate to risk transfer

SYLLABUS:

UNIT-I

UNIT-III
Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics –
solid waste management – post disaster – bio terrorism -threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

UNIT-IV
Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT-V
Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-VI
Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.- Institutional capacity in disaster management -The Red cross and red crescent movement.-Corporate sector and disaster risk reduction-A community focused approach.

TEXT BOOKS:
1. ‘Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy(2009),Universities press.

REFERENCE BOOKS:

***
CE606 (c) - INDUSTRIAL WATER & WASTE WATER MANAGEMENT

(Open Elective)

Lecture : 3 hrs/Week   Internal Assessment : Marks
Tutorial : 1 Hrs/Week   Semester End Examination : Marks
Practical : --   Credits : 3

Course Learning Objectives:
The course will address the following:

1. Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
2. To impart knowledge on selection of treatment methods for industrial wastewaters.
3. To know the common methods of treatment in different industries.
4. To acquire knowledge on operational problems of common effluent treatment plant.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

b. Learn the manufacturing process of various industries.
c. Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity.

SYLLABUS:

UNIT – I
Industrial water Quantity and Quality requirements: Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.

UNIT – II

UNIT – III
Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -
Civil Engineering

Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization – Equalization and proportioning- recycling, reuse and resources recovery.

UNIT – IV

**Industrial wastewater disposal management:** discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.

UNIT – V

**Process and Treatment of specific Industries-1:** Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

UNIT – VI

**Process and Treatment of specific Industries-2:** Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants.

**Text book**

2. Industrial Wastewater Treatment by KVSG Murali Krishna.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning, Delhi.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3r
d Edition.

**References**

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc-GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and Eddy Inc., Tata McGrawhill Co., New Delhi

***
Course Learning Objectives:
The objective of this course is:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. To enable the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, landscaping and expansion of towns.

Course Outcomes:
Upon the successful completion of this course:

a. The student should be able to distinguish architectural styles of eastern and western world.
b. The student should understand the importance of Orders of architecture.
c. Should be able to compose spaces of buildings using design concepts, planning principles.
d. Should understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.

SYLLABUS:

UNIT – I


UNIT – II

UNIT - III
Principles of Planning: Principles of planninga residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.

UNIT – IV
Historical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT – V
Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation- planning regulations and limitations.

UNIT – VI
Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns-floating towns- sky scrapers-pyramidal cities.

TEXTBOOKS:
1. ‘The great ages of World Architecture’ by G.K. Hiraskar.
2. ‘Planning and Design of Buildings by Section of Architecture’ by Y. S. Sane.

REFERENCES:
1. ‘Drafting and Design for Architecture’ by Hepler, Cengage Learning
3. ‘Mordern Ideal Homes for India’ by R. S. Deshpande.

***
CE606 (e) - FINITE ELEMENT METHOD
(Open Elective)

Lecture : 3 hrs/Week   Internal Assessment : Marks
Tutorial : 1 Hrs/Week   Semester End Examination : Marks
Practical : --   Credits : 3

Course Learning Objectives:
The objective of this course is:
1. Equip the students with the fundamentals of Finite Element Analysis
2. Enable the students to formulate the design problems into FEA.
3. Enable the students to solve Boundary value problems using FEM.

Course Outcomes:
Upon completion of the course, the student will be able to
b. Develop finite element formulation of one and two dimensional problems and solve them.
c. Assemble Stiffness matrices, Apply boundary conditions and solve for the displacements.
d. Compute Stresses and Strains and interpret the result.

SYLLABUS:

UNIT-I

UNIT-II
Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships- Constitutive relationship for plane stress, plane stain and axi symmetric bodies of revolution with axi symmetric loading.

UNIT-III
UNIT-IV

**Finite element formulation of Beam elements:** Beam stiffness- assemblage of beam stiffness matrix- Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

UNIT-V

Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces

UNIT-VI

**Iso-parametric Formulation:** An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical integrations.

TEXT BOOKS

2. ‘Introduction to Finite Elements in Engineering’ by Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.

REFERENCES:

1. ‘Concepts and applications of Finite Element Analysis’by Robert D. Cook, Michael E Plesha, John Wiley & sons Publications.
CE606 (f) - GREEN TECHNOLOGIES
(Open Elective)

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is:
1. To present different concepts of green technologies.
2. To acquire principles of Energy efficient technologies.
3. To impart knowledge on the methods of reducing CO₂ levels in atmosphere.
4. To gain knowledge of the importance of life cycle assessment
5. To learn the importance of green fuels and its impact on environment.

Course Learning Outcomes
Upon successful completion of this course, the students will be able to:
   a. Enlist different concepts of green technologies in a project
   b. Understand the principles of Energy efficient technologies
   c. Estimate the carbon credits of various activities
   d. Identify the importance of life cycle assessment
   e. Recognize the benefits of green fuels with respect to sustainable development.

SYLLABUS:

UNIT- I

UNIT- II

UNIT- III
Cleaner Production Project Development and Implementation: Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance,

UNIT- IV

UNIT -V
Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working and application.

UNIT- VI
Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economical and social impacts- public policies and market-driven initiatives. Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

REFERENCES:
3. ‘Cleaner Production Audit’ by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
4. ‘Handbook of Organic Waste Conversion’ by Bewik M.W.M.
6. ‘Non-conventional Energy Sources’ by Rai G.D.
7. ‘Solar Energy’ by Sukhatme S.P.
8. ‘Waste Energy Utilization Technology’ by Kiang Y. H.
Course Objectives:
The objective of this course is:

- To enhance the students knowledge and skills in engineering drawing
- To introduce computer aided drafting packages and commands for modeling and sketching.
- To learn surface modeling techniques required designing and machining
- To draw the geometric entities and create 2D and 3D wire frame models.
- To learn various modelling techniques such as edit, zoom, cross hatching, pattern filling, rotation, etc.

Course outcomes:
Up on completion of the course, the student shall be able to:
1) Understand the paper –space environment thoroughly
2) Develop the components using 2D and 3D wire frame models through various editing commands.
3) Generate assembly of various components of compound solids.

UNIT-I
Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids.


UNIT-II
Objective: The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of
solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic.

**Development And Interpenetration Of Solids:** Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

**UNIT-III**

**Objective:** Isometric projections provide a pictorial view with a real appearance. Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.


**Transformation of Projections:** Conversion of Isometric Views to Orthographic Views – Conventions.

**Perspective Projections:** Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

**PART- B COMPUTER AIDED DRAFTING**

**UNIT- IV**

**Introduction To Computer Aided Drafting:** Generation of points, lines, curves, polygons, dimensioning. Types of modelling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modelling, 3D wire frame modelling.

**UNIT -V**

**Objective:** By going through this topic the student will be able to understand the paper-space environment thoroughly.

**View Points And View Ports:** view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

**UNIT -VI**

**Computer Aided Solid Modelling:** Isometric projections, orthographic projections of isometric projections, Modelling of simple solids, Modelling of Machines & Machine Parts.
TEXT BOOKS:
2. Engineering drawing by N.D Bhatt, Charotar publications.

REFERENCES:
5. Engineering Drawing – RK Dhawan, S Chand

Internal Evaluation: Max. Marks: 30
The total internal evaluation marks are distributed in following two components:
1. Day-to-day work : 20 marks
2. Internal test : 10 marks
   I Mid (Internal Test 1) Examination Part A - Conventional drawing Exam II Mid (Internal Test 2) Examination Part B - In Computer Lab
(Note: The duration of the internal test is 2 hours and it must be conducted as per the schedules notified. The internal test may be conducted for 40 marks and it may be reduced to 10 marks).

End Semester Examination (Total Duration: 4 Hours, Max. Marks: 70)
   PART A – Conventional drawing pattern (Duration: 2 Hours, Marks: 35)
   PART B – Computer lab pattern using any drafting packages (Duration: 2 Hours, Marks: 35)
(Note: both PART A and PART B are compulsory and are to be conducted in separate sessions)
Since the pattern of the internal and external examination is not specified in the R13 academic regulation, it is requested that the above pattern may be approved.

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Course Learning Objectives:
The objective of this course is:
1. To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bitumen mix.
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

a. Ability to test aggregates and judge the suitability of materials for the road construction
b. Ability to test the given bitumen samples and judge their suitability for the road construction
c. Ability to obtain the optimum bitumen content for the mix design
d. Ability to determine the traffic volume, speed and parking characteristics.

SYLLABUS:

I. ROAD AGGREGATES:
1. Aggregate Crushing value
2. Aggregate Impact Test.
4. Attrition Test
5. Abrasion Test.
6. Shape tests
II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

IV. TRAFFIC SURVEYS:
1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
4. Parking study.

V. DESIGN & DRAWING:
1. Earthwork calculations for road works.
2. Drawing of road cross sections.
3. Rotors intersection design.

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval’s Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches
TEXT BOOKS:

REFERENCE BOOKS:
1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

***
Course Learning Objectives:
The objective of this course is:

1. Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
2. Provide knowledge of characterisation of wastewater generated in a community.
4. Summarize the appurtenance in sewerage systems and their necessity.
5. Teach planning, and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems.
6. Effluent disposal method and realise the importance of regulations in the disposal of effluents in rivers.

Course Outcomes:
By the end of successful completion of this course, the students will be able to:

a. Plan and design the sewerage systems
b. Characterisation of Sewage
c. Select the appropriate appurtenances in the sewerage systems
d. Selection of suitable treatment flow for sewage treatment
e. Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

SYLLABUS:

UNIT – I:
Introduction to sanitation – systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage –

UNIT – II:

**Pumping of wastewater:** Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters.

**House Plumbing:** systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage.

UNIT – III:

**Sewage characteristics** – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.

Treatment of sewage : Primary treatment-Screens-grit chambers-grease traps–floatation– sedimentation – design of preliminary and primary treatment units.

UNIT – IV:

**Secondary treatment:** Aerobic and anaerobic treatment process-comparison.

**Suspended growth process:** Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

**Attached Growth Process:** Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors.

UNIT V:


UNIT – VI:

**Bio-solids (Sludge) management:** Characteristics- handling and treatment of sludge-thickening – anaerobic digestion of sludge.

**Disposal of sewage:** methods of disposal – disposal into water bodies- Oxygen Sag Curve-disposal on land- sewage sickness.
Text Books


References

2. Sewage treatment and disposal by Dr. P.N. Modi& Sethi.

***
Course Learning Objectives:
The course is designed to
1. introduce the types of irrigation systems
2. introduce the concepts of planning and design of irrigation systems
3. discuss the relationships between soil, water and plant and their significance in planning an irrigation system.
4. understand design methods of erodible and non-erodible canals
5. know the principles of design of hydraulic structures on permeable foundations.
6. know the concepts for analysis and design principles of storage and diversion head works.
7. learn design principles of canal structures

Course Outcomes
At the end of the course the student will be able to
a. estimate irrigation water requirements
b. design irrigation canals and canal network
c. plan an irrigation system
d. design irrigation canal structures
e. plan and design diversion head works
f. analyse stability of gravity and earth dams
g. design ogee spillways and energy dissipation works

SYLLABUS:

UNIT-I
Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of
irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals - Kennedy’s silt theory and Lacey’s regime theory, balancing depth of cutting.

UNIT III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall.

Regulators: Head and cross regulators, design principles

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

Outlets: types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh’s creep theory, Khosla’s theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-VI

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.
TEXT BOOKS:

3. ‘Irrigation Engineering’ by Raghunath H.M (2012), Wiley India.

REFERENCES:


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Course Learning Objectives:
The objective of this course is:

1. To introduce the student the concept of project management including network drawing and monitoring.
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
3. To introduce the importance of safety in construction projects.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

1. Appreciate the importance of construction planning.
2. Understand the functioning of various earth moving equipment.
3. Know the methods of production of aggregate products and concreting.
4. Apply the gained knowledge to project management and construction techniques.

SYLLABUS:

UNIT- I

UNIT -II
Project evaluation and review technique – cost analysis – updating – crashing for optimum cost – crashing for optimum resources – allocation of resources.

UNIT- III
and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

**UNIT -IV**

**UNIT -V**

**UNIT -VI**

**TEXT BOOKS:**
1. ‘Construction Planning , Equipment and Methods’ by Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill.
3. ‘Construction Technology’ by Subir K. Sarkar and Subhajit Saraswati, Oxford University press.

**REFERENCES:**
1. ‘Construction Project Management - An Integrated Approach’ by Peter Fewings , Taylor and Francis
2. ‘Constructicon Management Emerging Trends and Technologies’ by Trefor Williams , Cengage learning .
Course Learning Objectives:
The objective of this course is:

1. Familiarize Students with concepts of prestressing.
2. Equip student with different systems and devices used in prestressing.
3. Understand the different losses of prestress including short and long term losses.
4. Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion.

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

a. Understand the different methods of prestressing.
b. Estimate the effective prestress including the short and long term losses.
c. Analyze and design prestressed concrete beams under flexure and shear.
d. Understand the relevant IS Codal provisions for prestressed concrete

SYLLABUS:

UNIT-I
Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength-Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

UNIT-II
Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section-
pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III
Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design.

UNIT-IV

UNIT-V
Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-IV
Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXT BOOKS
1. ‘Prestressed Concrete’ by N. Krishna Raju, Tata McGraw hill
2. ‘Prestressed Concrete’ by S. Ramamrutham

REFERENCES:
1. ‘Prestressed Concrete’ by P. Dayaratnam
2. ‘Prestressed Concrete’ by T. Y. Lin & Burns, Wiley Publications

***
IV Year – I SEMESTER

CE802-REMOTE SENSING AND GIS APPLICATIONS

<table>
<thead>
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<th>Lecture</th>
<th>3 hrs/Week</th>
<th>Internal Assessment</th>
<th>Marks</th>
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<tbody>
<tr>
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<td>1 Hrs/Week</td>
<td>Semester End Examination</td>
<td>Marks</td>
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<tr>
<td>Practical</td>
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<td>Credits</td>
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Course Learning Objectives:
The course is designed to
1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms
3. Learn concepts of visual and digital image analyses
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering

Course outcomes
At the end of the course the student will be able to
a. Be familiar with ground, air and satellite based sensor platforms.
b. Interpret the aerial photographs and satellite imageries
c. Create and input spatial data for GIS application
d. Apply RS and GIS concepts in water resources engineering

SYLLABUS:

UNIT – I
Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT – II
Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.
UNIT – III
Geographic Information System: Introduction, key components, application areas of GIS, map projections.
Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV
Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V
RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT - VI
Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS:

REFERENCES:
IV Year – I SEMESTER

CE705 (a) - GROUND IMPROVEMENT TECHNIQUES

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Elective-I

Course Learning Objectives:
The objective of this course is:

1. To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.

2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.

3. To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.

4. To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

a. By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.

b. The student should be in a position to design a reinforced earth embankment and check its stability.

c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.

d. The student should be able to understand the concepts and applications of grouting.

SYLLABUS:

UNIT-I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.
UNIT -II
Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III

UNIT- IV

UNIT- V

UNIT-VI

TEXT BOOKS:

REFERENCE BOOKS:
1. ‘Ground Improvement’ by MP Moseley, Blackie Academic and Professional, USA.
2. ‘Designing with Geosynthetics’ by RM Koerner, Prentice Hall.

***
CE705 (b) - AIR POLLUTION AND CONTROL
(Elective-I)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The course will address the following:
1. To know the analysis of air pollutants
2. To know the Threshold Limit Values (TLV) of various air pollutants
3. To acquire the design principles of particulate and gaseous control
4. To learn plume behaviour in different environmental conditions
5. To learn carbon credits for various day to day activities

Course Learning Outcomes:
Upon successful completion of this course, the students will be able to:
a. Decide the ambient air quality based the analysis of air pollutants.
b. The design principles of particulate and gaseous control measures for an industry.
c. Judge the plume behaviour in a prevailing environmental condition
d. Estimate carbon credits for various day to day activities.

SYLLABUS:

UNIT – I
Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into µg/m³. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution - Climate Change and its impact - Carbon Trade.

UNIT-II

UNIT – III
Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of
Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams, Plume Rise Models.

UNIT-IV

**Ambient Air Quality Management:** Monitoring of SPM, SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

UNIT-V

**Air Pollution Control:** Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters– scrubbers, Electrostatic precipitators.

UNIT – VI

**Air Pollution Control Methods:** Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

**TEXT BOOKS:**


**REFERENCE:**


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CE705 (c) - MATRIX METHODS OF STRUCTURAL ANALYSIS
(Elective-I)

Lecture : 3 hrs/Week  Internal Assessment :  Marks
Tutorial : 1 Hrs/Week  Semester End Examination :  Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is:
1. Learn the fundamental concepts of matrix structural mechanics, such as the stiffness method.
2. The concepts of structural analysis learnt in mechanics of solids and structures course.
3. Understanding the analysis of statically determinate and indeterminate structures such as trusses, beams, frames and plane stress problems.
4. Learn the concepts of the stiffness method and apply it to a variety of structural problems involving trusses, beams, frames, and plane stress.

Course Outcomes:
Upon completion of the course, the student will be able to
a. Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent deformations, force and equilibrium methods.
b. Perform structural analysis using the stiffness method.
c. Solve multiple degree of freedom two dimensional problems involving trusses, beams, frames and plane stress.

SYLLABUS:

UNIT-I

UNIT-II
Generation Element stiffness matrix for truss element, beam element and torsional element- Element force - displacement equations.
UNIT-III

UNIT-IV

UNIT-V

UNIT-VI
Space trusses and frames - Member stiffness for space truss and space frame– Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames.

TEXT BOOK :
1. ‘Matrix Methods of Structural Analysis’ by Pundit and Gupta

REFERENCES:
2. ‘Advanced structural analysis’ by Dr. P. Dayaratnam- Tata Mc Graw hill publishing company limited.

***
CE705 (d) - URBAN HYDROLOGY
(Elective-I)

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The course is designed to:
1. appreciate the impact of urbanization on catchment hydrology
2. understand the importance of short duration rainfall runoff data for urban hydrology studies.
3. learn the techniques for peak flow estimation for storm water drainage system design.
4. understand the concepts in design of various components of urban drainage systems.
5. learn some of the best management practices in urban drainage.
6. understand the concepts of preparation master urban drainage system.

Course Outcomes
At the end of the course the student will be able to
a. develop intensity duration frequency curves for urban drainage systems.
b. develop design storms to size the various components of drainage systems.
c. apply best management practices to manage urban flooding.
d. prepare master drainage plan for an urbanized area.

SYLLABUS:

UNIT I

UNIT II
Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF)curves, design storms for urban drainage systems.
UNIT III
Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and stormwater reuse, major and minor systems.

UNIT IV
Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT V
Analysis and Management: Stormwater drainage structures, design of stormwater network—Best Management Practices—detention and retention facilities, swales, constructed wetlands, models available for stormwater management.

UNIT IV
Master drainage plans: Issues to be concentrated upon—typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, use of models in planning.

TEXT BOOKS:

REFERENCES
CE705 (e) - ADVANCED SURVEYING
(Elective-I)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is to enable the students to,

1. Understand the basics of Geodetic Surveying and triangulation systems.
2. Understand the hydrometric surveying and prediction of tides.
4. Understand the importance and applications of total stations and GPS.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. The student should be able to conduct different types of surveys for obtaining better results.
b. The student should be able to utilize the total stations for getting the required information.
c. The student should be capable of using the GPS instrument to obtain appropriate information of the objects and their positions.

SYLLABUS:

UNIT – I
Geodetic Surveying: Definition, importance, triangulation system, order of triangulation, size and shape of triangulation, strength of figure criterion, triangulation fieldwork, base line measurement- tape corrections, problems in baseline measurement, measurement of angles.

UNIT – II
Hydrographic Surveying: Tides-lunar tides, solar tides, spring and neap tides, measurement of tides- shore lines, soundings, sounding equipments, locating soundings by cross rope method and range and time intervals-mean sea level-prediction of tides.

UNIT – III
Photogrammetric Surveying: Basic principles, photo theodolite, horizontal and vertical angles from terrestrial photographs, elevation of a point by
photographic measurement, determination of focal length of the lens, Aerial camera- scale of vertical photograph, scale of tilted photograph, combined effects of tilt and relief, stereoscopic vision, mosaics.

UNIT – IV
Astronomical Surveying: Spherical Trigonometry, latitude and longitude, solar system, astronomical teams, coordinate systems-altitude, azimuth system, declination, hour angle system, time and astronomical work-sidereal time, apparent solar time, mean solar time, standard time, standard time, application of astronomy in surveying, corrections to astronomical observations.

UNIT – V
Total stations: Importance, measurement of horizontal angles, vertical angles, horizontal distance, slope distance, height of object-remote elevation measurement (REM), remote distance measurement (RDM)-radial and continuous distances for measuring the lengths and sides of the closed circuits, areas and perimeters calculations.

UNIT – VI

TEXT BOOKS:
1. ‘Surveying and Levelling’ by R. Subramanian, Oxford University Press, New Delhi.

REFERENCES:

***
CE705 (f) - INTERIOR DESIGNS AND DECORATIONS
(Elective-I)

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is to enable the students to

1. Understand the elements and principles of interior designs and decorations.
2. Learn the importance of art elements in the composition of building spaces.
3. Learn the new design concepts for developing interiors of buildings.
4. Learn the application of colors, lightings, furniture in creating beautiful interiors.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. understand the importance of interior designs and decorations.

b. Should realize the use of art elements in the composition of building spaces.

c. Should learn the new design concepts for developing interiors of buildings.

d. Learn be able to apply colors, lightings, furniture in creating beautiful interiors.

SYLLABUS:

UNIT-I
Development of interior design concepts- importance for interiors in modern buildings, changing trends and salient features, objectives of aesthetic planning - beauty, expressiveness, functionalism, economy- good taste - meaning and importance- developing skill in aesthetics.

UNIT-II
Designs- concepts, meaning, purpose, types - structural and decorative characteristics, forms to function relationship, elements of designs - line and direction, form and shape, size, colour, light, pattern, texture and space - application of elements to form designs.
UNIT-III
Application of colour harmonies in the interiors and exteriors – effects of light on colour, Illusion of colour, psychology of colour, effect of colour on each other-uses and application of colours- walls, wall finishes, ceilings, roofs, decorative exteriors.

UNIT-IV
Importance of lighting – artificial lighting - light sources, types and uses of light, specific factors in lighting- measurements of lighting, psychological aspects of light, glare, types of glare and prevention– selection of lamps, lighting fixtures, lighting for various areas and activities.

UNIT-V
Principles of design – balance, rhythm, emphasis, harmony, proportion - meaning and application of design concepts in the interior and exterior houses and other commercial buildings- development of design from motifs, elements of art-selection of different art forms, display of art pieces.

UNIT –VI
Interior furnishings- floors, floor coverings, soft furnishings, furniture- selection and arrangement, placement of accessories, home accessories-interior decorations- flower arrangement, floor decorations, interior decoration trends in India.

TEXT BOOKS:

REFERENCES:

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Course Learning Objectives:
The course will address the following:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. It also gives the significance of the characteristics of the water and wastewater.

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

a. Estimation some important characteristics of water and wastewater in the laboratory.
b. Draw some conclusion and decide whether the water is potable or not.
c. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments.
d. Estimation of the strength of the sewage in terms of BOD and COD.

SYLLABUS:
List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil.
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
8. Determination of N, P, K values in solid waste
10. Determination of C.O.D.
13. Presumptive Coliform test.

**NOTE:** At least 10 of the above experiments are to be conducted.

**List of Equipments**
1) pH meter
2) Turbidity meter
3) Conductivity meter
4) Hot air oven
5) Muffle furnace
6) Dissolved Oxygen meter
7) U–V visible spectrophotometer
8) COD Reflux Apparatus
9) Jar Test Apparatus
10) BOD incubator
11) Autoclave
12) Laminar flow chamber
13) Hazen’s Apparatus

**Text Books**

**Reference**
1. Relevant IS Codes.

***
IV Year – I SEMESTER

CE806-GIS & CAD LAB

Lecture : --  Internal Assessment : 30 Marks
Tutorial : --  Semester End Examination : 70 Marks
Practical : 3 hrs/Week  Credits : 2

Course Learning Objectives:
The course is designed to
1. introduce image processing and GIS software
2. familiarize structural analysis software
3. understand the process of digitization, creation of thematic map from toposheets and maps.
4. learn to apply GIS software to simple problems in water resources and transportation engineering.
5. learn to analyse 2 D and 3D frame steel tubular truss using structural analysis software.
6. learn to analyse and design retaining wall and simple towers.

Course outcomes
At the end of the course the student will be able to
a. work comfortably on GIS software
b. digitize and create thematic map and extract important features
c. develop digital elevation model
d. use structural analysis software to analyse and design 2D and 3D frames.
e. design and analyse retaining wall and simple towers using CADD software.

GIS:

SOFTWARES:
1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5
Any one or Equivalent.
EXERCISES IN GIS:
1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in Water Resources Engineering & Transportation Engineering.

COMPUTER AIDED DESIGN AND DRAWING:

SOFTWARE:
1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

EXERCISES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design

TEXT BOOK:
Course Learning Objectives:
The objective of this course is to enable the students to:
1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

Course Outcomes:
Upon the successful completion of this course:
a. The student should be able to determine the quantities of different components of buildings.
b. The student should be in a position to find the cost of various building components.
c. The student should be capable of finalizing the value of structures.

SYLLABUS:
UNIT – I

UNIT – II
Rate Analysis – Working out data for various items of work over head and contigent charges.

UNIT-III
Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.
UNIT – IV

UNIT-V
Detailed Estimation of Buildings using individual wall method.

UNIT -VI
Detailed Estimation of Buildings using centre line method.

FINAL EXAMINATION PATTERN:
The end examination paper should consist of SIX questions from Unit 1 to Unit 4, out of which THREE are to be answered (60% weight-age) & ONE mandatory question (40% weight-age) from Units 5 & 6 is to be answered.

TEXT BOOKS:

REFERENCES:
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
3. ‘Estimation, Costing and Specifications’ by M. Chakraborthi; Laxmi publications.
Course Learning Objectives:

1. An overview of the evolution of new construction materials in geotechnical engineering and to initiate geosynthetic materials.
2. Understanding the properties and the testing methods of different types of materials of geosynthetics.
3. The knowhow of manufacturing methods, uses and applications of geotextiles, geogrids, geomembranes and geocomposites.
4. The concepts of designing geosynthetics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers.
5. Designing criteria of reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, landfill liners, caps and closures, dams and embankments.
6. Additional advantages of geocomposites, geowebs and geocells, and moisture barriers and natural geotextiles etc. for applications to meet various functions.

Course Outcomes:

At the successful completion of this course the student will be able to

4. Realize the need and demand for the use of geosynthetic materials in the field of geotechnical construction works.
5. Conduct required laboratory and field tests to obtain the properties of different materials of geosynthetics.
6. Distinguish and describe various manufacturing methods of geotextiles, geogrids, geomembranes and geocomposites.
7. Understand concepts and could design the geosynthetics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers.
8. Design reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, landfill liners, caps and closures.
9. Distinguish survivability requirements of geocomposites and could design geowebs, geocells, and moisture barriers and natural geotextiles etc.

SYLLABUS:

UNIT-I

UNIT-II

UNIT-III
Use of Geosynthetics in Roads: Geosynthetics in road ways- applications- role of subgrade conditions-desidn criteria-survivability-application in paved roads.

UNIT-IV

UNIT-V

UNIT-VI
Natural Geotextiles: Natural fibres as geotextiles- factors governing the use- jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.
TEXT BOOKS:


REFERENCES:


***
CE706 (b) - ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

(Elective-II)

Lecture: 3 hrs/Week  Internal Assessment: Marks
Tutorial: 1 Hrs/Week  Semester End Examination: Marks
Practical: --  Credits: 3

Course Learning Objectives:
The objective of this course is:
1. To impart knowledge on different concepts of Environmental Impact Assessment.
2. To know procedures of risk assessment
3. To learn the EIA methodologies and the criterion for selection of EIA methods.
4. To pre-requisites for ISO 14001 certification
5. To know the procedures for environmental clearances and audit
6. To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes
Upon successful completion of this course, the students will be able to:
a. Prepare EMP, EIS, and EIA report
b. Identify the risks and impacts of a project
c. Selection of an appropriate EIA methodology
d. Evaluation the EIA report
e. Estimate the cost benefit ratio of a project
f. Know the role of stakeholder and public hearing in the preparation of EIA

SYLLABUS:

UNIT – I
Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA.

UNIT – II
EIA Methodologies: introduction, Criteria for the selection of EIA Methodology, EIA methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.
UNIT-III
Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V
Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.
Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment

UNIT-VI
Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

REFERENCES:
3. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd., Delhi.

***
CE706 (c) - ADVANCED STRUCTURAL ENGINEERING  
(Elective-II)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is:

1. Familiarize Students with Raft Foundations and Retaining walls.
2. Equip student with concepts of design of different types of RCC water tanks.
3. Understand Concepts of flat slabs
4. Familiarize different types of Bunkers, Silos and Chimneys.
5. Understand different types of transmission towers.

Course Outcomes:
At the end of this course the student will be able to
a. Design raft foundations and different types of RCC retaining walls
b. Carryout analysis and design of different types of RCC water tanks
c. Solve the problems design of RCC Bunkers, Silos and Chimneys
d. Understand various types of transmission towers and loading on them.

SYLLABUS:

UNIT – I
Analysis and Design of Raft Foundations – Design of RCC Retaining walls:
Cantilever and Counter fort

UNIT – II
Analysis and Design of RCC Water Tanks, Circular and Rectangular types-
Intze tank including staging.

UNIT – III
Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear.

UNIT - IV
Analysis and Design of Bunkers and Silos- Concepts of Loading.
UNIT-V
Analysis and Design of Chimney, Concepts of loading

UNIT-VI
Introduction to Transmission Towers- Principles and procedures

TEXT BOOKS:
1. ‘Reinforced Concrete Structures’ Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. ‘Reinforced Concrete Structures’ by N. Subrahmanian, Oxford Publishers

REFERENCES:

Codes: Relevant IS: codes.

INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.
CE706 (d) - GROUND WATER DEVELOPMENT AND MANAGEMENT

(Lecture: 3 hrs/Week) (Internal Assessment: Marks)
(Tutorial: 1 Hrs/Week) (Semester End Examination: Marks)
(PRACTICAL: --) (Credits: 3)

Course Learning Objectives:
The course is designed to

1. Appreciate groundwater as an important natural resource.
2. Understand flow towards wells in confined and unconfined aquifers.
3. Understand the principles involved in design and construction of wells.
4. Create awareness on improving the groundwater potential using various recharge techniques.
5. Know the importance of saline water intrusion in coastal aquifers and its control measures.
6. Appreciate various geophysical approaches for groundwater exploration.
7. Learn groundwater management using advanced tools.

Course Outcomes
At the end of the course the student will be able to

a. Estimate aquifer parameters and yield of wells.
b. Analyse radial flow towards wells in confined and unconfined aquifers.
c. Design wells and understand the construction practices.
d. Interpret geophysical exploration data for scientific source finding of aquifers.
e. Determine the process of artificial recharge for increasing groundwater potential.
f. Take effective measures for controlling saline water intrusion.
g. Apply appropriate measures for groundwater management.
SYLLABUS:

UNIT – I
Introduction
Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics
Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow’s methods, Leaky aquifers.

UNIT – II
Well Design
Water well design—well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III
Well Construction and Development
Water wells, drilling methods—rotary drilling, percussion drilling, well construction-installation of well screens—pull-back method, open-hole, bail-down and wash-down methods, well development—mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV
Artificial Recharge
Concept of artificial recharge of groundwater, recharge methods—basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.

Saline Water Intrusion
Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT – V
Geophysics
Surface methods of exploration of groundwater—Electrical resistivity and Seismic refraction methods, Sub-surface methods—Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNIT – VI
Groundwater Modelling and Management
Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

TEXT BOOKS:

REFERENCES:

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CE706 (e) - TRAFFIC ENGINEERING
(Elective-II)

Lecture: 3 hrs/Week   Internal Assessment: Marks
Tutorial: 1 Hrs/Week  Semester End Examination: Marks
Practical: --          Credits: 3

Course Learning Objectives:
The objective of this course is:
1. To know various components and characteristics of traffic.
2. To know various traffic control devices and principles of highway safety.
3. To understand the detrimental effects of traffic on environment.
4. To know highway capacity and level of service concepts.
5. To learn about intelligent vehicle highway systems.

Course Outcomes:
At the end of course, Student can
a. Determine traffic speed, volume, travel time and density.
b. Design traffic signals
c. Determine highway capacity

SYLLABUS:

UNIT- I
Components Of The Traffic System: Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification; Traffic Studies: Inventories; Volume studies; Speed, Travel time and Delay studies; Intersection studies; Pedestrian studies; Parking studies; Accident studies.

UNIT- II
Traffic Characteristics: Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Microscopic and macroscopic speed characteristics: Vehicular speed Trajectories; Speed characteristics – Mathematical distribution; Speed and travel time variations; Travel time and delay studies. Microscopic and Macroscopic density characteristics: Distance headway characteristics; Car-following theories; Density measurement techniques; Density contour maps.
UNIT- III
Traffic Control Devices & Highway Safety: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Webster method; ARRB method; Drew’s Method; IRC method; Signal coordination; Area Traffic control. Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.

UNIT- IV
Environmental Considerations: Air pollution: Kinds of pollutants; Air pollution standards; Measures of air quality; modelling and control. Noise pollution: Measurement of sound levels; Acceptable limits, Prediction of noise levels, Traffic noise control.

UNIT- V
Highway Capacity And Level Of Service: Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads; HCM and IRC standards.

UNIT- VI
Intelligent Vehicle – Highway Systems: Traffic surveillance and monitoring; IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS.

TEXT BOOKS

REFERENCES:
1. ‘Traffic Engineering Hand Book’ by Institute of Transportation Engineers, 4 Ed., Prentice Hall
2. ‘Traffic Engineering’ by Mc Shane, WR and RP Roess, Prentice Hall.
4. ‘Traffic Planning and Engineering’ by Hobbs FD., Pergamon press
5. ‘Traffic flow fundamentals’ by May, AD., Prentice Hall.
CE706 (f) - INFRASTRUCTURE MANAGEMENT  
(Elective-II)  

Lecture :  3 hrs/Week  Internal Assessment :  Marks  
Tutorial :  1 Hrs/Week  Semester End Examination :  Marks  
Practical :  --  Credits :  3  

Course Learning Objectives:  
Infrastructure Management focuses on the processes necessary for the planning and development of new infrastructure, and on maintaining and operating mature infrastructure for sustainability. A wide variety of management topics are covered, such as infrastructure planning, infrastructure economics, infrastructure management systems, optimal maintenance management, reliability of infrastructure systems, asset valuation and utilization, and infrastructure planning under risk and uncertainty.  

Course Outcomes:  
Upon the successful completion of this course, the students will be able to:  

SYLLABUS:  

UNIT-I  
Performance Measures & Deterioration Modeling: Defining performance, Common characteristics of infrastructures, Condition assessment and condition indices; Different types of deterioration models; Empirical and Mechanistic models, Markov and Semi-Markov models, Risk-based deterioration modeling  

UNIT-II  
PRIORITIZATION AND MAINTENANCE PLANNING & POLICY: Needs Analysis, Ranking by single criteria, Ranking by fixed and variable trigger points, Single/multiple-year prioritization; Different types of maintenance planning, Maintenance policy.  

UNIT-III  
INFRASTRUCTURE ECONOMICS: Costs and benefits, Trade-off Analysis, Cost-effectiveness technique and Budget allocation.  

UNIT-IV  
OPTIMIZATION: Objective functions, decision variables and constraints, Optimization techniques, Optimal maintenance planning.
UNIT-V


UNIT-VI

Tools and Technology: Destructive Testing, Nondestructive Testing, Database Management System for Inventory Data Control, Other Information Technology.

TEXT BOOKS:


REFERENCES:

IV Year – II SEMESTER

CE803 (a) - ADVANCED FOUNDATION ENGINEERING

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is:

1. To enable the student to appreciate how Meyerhof’s general bearing capacity equations are important over Terzaghi’s bearing capacity equation.

2. To teach the student special methods of computation of settlements and the corrections to be applied to settlements.

3. To enable the student to understand the advanced concepts of design of pile foundations.

4. To teach the student the problems posed by expansive soils and the foundation practices appropriate to expansive soils.

5. To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.

Course Outcomes:
Upon successful completion of this course, student will be able to

a. Compute the safe bearing capacity of footings subjected to vertical and inclined loads.

b. Understand the advanced methods of settlement computations and proportion foundation footings.

c. Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.

d. Appreciate the problems posed by expansive soils and the different foundation practices devised.

e. Appreciate the difference between isolated footings and combined footings and mat foundations.
SYLLABUS:

UNIT-I
Bearing capacity of Foundations using general bearing capacity equation – Meyerhof’s, Brinch Hansen’s and Vesic’s methods.

UNIT-II

UNIT-III

UNIT-IV

UNIT-V

UNIT-VI

TEXT BOOKS:


REFERENCE BOOKS:


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Course Learning Objectives:
The objective of this course is:

1. To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.
2. To acquire the principles of treatment of municipal solid waste
3. To know the impact of solid waste on the health of the living beings
4. To learn the criterion for selection of landfill and its design
5. To plan the methods of processing such as composting the municipal organic waste.

Course Learning Outcomes
Upon successful completion of this course, the students will be able to:

a. Design the collection systems of solid waste of a town
b. Design treatment of municipal solid waste and landfill
c. To know the criteria for selection of landfill
d. To characterise the solid waste and design a composting facility

SYLLABUS:

UNIT- I
Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT- II
Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste

UNIT- III
Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

UNIT- IV
Separation and Transformation of Solid Waste: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

UNIT- V

UNIT- VI

TEXT BOOKS

REFERENCES

***
CE803 (e) - EARTHQUAKE RESISTANT DESIGN  
(Elective-III)

Lecture : 3 hrs/Week  
Internal Assessment : Marks

Tutorial : 1 Hrs/Week  
Semester End Examination : Marks

Practical : --  
Credits : 3

Course Learning Objectives:
The objective of this course is:

1. Familiarize Students with Engineering Seismology
2. Equip student with concepts of Structural Dynamics
3. Understand Concepts of Seismic Design
4. Familiarize with Design philosophies for Seismic loading
5. Familiarize students with various IS codal provisions for ductile design and detailing

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

a) Explain fundamentals of Engineering Seismology
b) Acquaint with the principles Structural dynamics
c) Solve SDOF Systems and suggest ductile design
d) Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions

SYLLABUS:

UNIT-I
Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II
UNIT-III

UNIT-IV
Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

UNIT-V
Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement- Development length, Lap Splices.

UNIT-VI
Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.

TEXT BOOK
2. ‘Earthquake Resistant Design of Building Structures’ by Vinod Hosur, Wiley India Ltd.
3. ‘Reinforced Concrete Design’by A. K. Jain.

REFERENCES
2. Relevant code of practices.
CE803 (d) - WATERSHED MANAGEMENT
(El3ective-III)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The course is designed to:
1. introduce the concept of watershed management
2. understand the watershed characteristics
3. learn the principles of soil erosion and measures to control erosion
4. appreciate various water harvesting techniques.
5. learn land management practices for various land use/land cover.
6. introduce concepts of watershed modelling.

Course outcomes
At the end of the course the student will be able to
a. calculate watershed parameters and analyse watershed characteristics to take appropriate management action.
b. quantify soil erosion and design control measures.
c. apply land grading techniques for proper land management.
d. suggest suitable harvesting techniques for better watershed management.
e. apply appropriate models for watershed management.

SYLLABUS:
UNIT-I
Introduction: Concept of watershed development, objectives of watershed development, need for watershed development, Integrated and multidisciplinary approach for watershed management.

UNIT-II
Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.
UNIT-III

**Principles of Erosion:** Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation.

**Measures to Control Erosion:** Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, brushwood dam, Gabion.

UNIT-IV

**Water Harvesting:** Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-V

**Land Management:** Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

UNIT-VI

**Watershed Modelling:** Data of watershed for modelling, application and comparison of watershed models, model calibration and validation, advances of watershed models.

TEXT BOOKS:


REFERENCES:

CE803 (e) - PAVEMENT ANALYSIS AND DESIGN
(Elective-III)

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is:
1. To know various factors affecting pavement design
2. To know various concepts for the stresses in pavements.
3. To understand material characterisation and mix design concepts.
4. To acquire design principles of flexible and rigid pavements.
5. To acquire design principles of shoulders, overlays and drainage.

Course Outcomes:
At the end of course, Student can
a. Design flexible and rigid pavements using various methods
b. Design shoulders, overlays and drainage.

SYLLABUS:
UNIT-I

UNIT-II
UNIT-III


UNIT-IV


UNIT-V


UNIT-VI


TEXT BOOKS:

REFERENCES:

4. ‘Dynamics of Pavement Structures’ by G. Martineek, Chapmen & Hall Inc.

***
CE803 (f) - GREEN BUILDINGS

(Elective-III)

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<td>Practical</td>
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Course Learning Objectives:
The objective of this course is:

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

SYLLABUS:

UNIT-I
Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage

UNIT- II
Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, ferro-cement and ferro-concrete, alternative roofing systems, various paints reducing the heat gain of the building, etc.

UNIT - III
Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities.

UNIT- IV
Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.
UNIT- V

Climate Design: Local climatic conditions – temperature, humidity, wind speed and direction-impact of climate change on built environment - comforts: the desirable conditions – Principles of thermal design - means of thermal –light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, garden roofs, case studies for passive cooling and thermal comfort.

UNIT- VI


TEXT BOOKS:


REFERENCES:

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Course Learning Objectives:
The basic course in soil mechanics/geotechnical engineering generally introduces the fundamental concepts, principles and applications of soil as engineering material with properties under static loading.

This course on ‘Soil Dynamics’ discusses
1. About the fundamentals of vibrations
2. about the behaviour and properties/response of soil as a material which is subjected to various types of dynamic or cyclic time-dependent loadings.
3. the design and analysis for machine foundations come along with this course to consider the dynamic properties of both soil and foundation as combined mass. Behaviour of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading are discussed here along with the reference to design code provisions.
4. Phenomena like liquefaction and lateral spreading of soil are also discussed.
5. Discusses about the laboratory and filed tests to determine the dynamic soil properties of the soil mass.

Course Outcomes:
On successful completion of these course, the student able to
a. Use theory of vibrations to find the behavior of soil under dynamic loading.
b. Design machine foundations under different loads and soil conditions.
c. Understand the liquefaction phenomenon.
d. Conduct various laboratory and field tests to determine the dynamic soil properties and its interpretation.
e. Design vibration isolators under any vibratory machines.

SYLLABUS:

UNIT-I

UNIT-II

UNIT-III
Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

UNIT-IV
Types of machine foundations – general requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure
Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

UNIT-V
Design data, design criteria, IS code provisions for the design foundations of Impact type of machines.

UNIT-VI
Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes
Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads.
TEXT BOOK:
1. ‘Vibrations of Soils and Foundations’ by Richart Hall and Woods

REFERENCES:
2. ‘Foundations of Machines- Analysis and Design’ by Prakash and Puri.
3. ‘Analysis and design of Foundations for Vibrations’ by P J Moore
4. ‘Fundamentals of Soil Dynamics’ by B M Das
5. ‘Dynamics of bases and Foundations’ by D D Barkar

***
CE804 (b) - ENVIRONMENTAL AND INDUSTRIAL HYGIENE
(Elective-IV)

Lecture : 3 hrs/Week Internal Assessment : Marks
Tutorial : 1 Hrs/Week Semester End Examination : Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is:
1. To provide with information regarding Occupational health, Hygiene, workplace safety.
2. To make aware of regulations, codes of practice in industrial hygiene.
3. To impart basic knowledge on industrial fatigue and ergonomics.
4. To know the basic right of an employee on safety aspects.

Course Learning Outcomes
Upon successful completion of this course, the students will be able to:
1. Identify aspects related to occupational health, Hygiene, workplace safety in an industry.
2. Know the regulations, codes of practice available with reference to industrial hygiene.
3. Enlist the common points related to ergonomics.
4. Know the safety equipment and the basic right of an employee on safety aspects.

SYLLABUS:

UNIT- I

UNIT- II

UNIT- III
Workplace Safety and Safety Systems: Features of the satisfactory design of work premises, ventilation. Safe installation and use of electrical supplies.
Fire safety and first aid provision. Significance of human factors in the establishment and effectiveness of safe systems. Safe systems of work for manual handling operations. Control methods to eliminate or reduce the risks arising from the use of work equipment. Requirements for the safe use of display screen equipment. Procedures and precautionary measures necessary when handling hazardous substances- Contingency arrangements for events of serious and imminent danger.

UNIT -IV

UNIT- V
Industrial Fatigue and Ergonomics:
Fatigue: Types of fatigue - circadian rhythms- sleep cycle-sleep debt-effects of fatigue-factors contributing to fatigue- mitigation of fatigue.
Ergonomics: definition-boundaries of ergonomics- objectives and principles of ergonomics-ergonomics relation with health and safety-ergonomics problems in work place-ergonomics improvements-identification of poor posture and risks.

UNIT- VI
Education and Training: Relationship between quality manuals, safety policies and written risk assessments. Records and other documentation required by an organisation for health and safety. Principles and methods of effective training- Feedback and evaluation mechanism.

TEXT BOOKS:

REFERENCES:
1. ‘Environmental and Health and Safety Management’ by Nicholas P. Cheremisinoff and Madelyn L.Graffia, William Andrew Inc. NY, 1995
CE804 (c) - REPAIR AND REHABILITATION OF STRUCTURES
(Elective-IV)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The objective of this course is:
1. Familiarize Students with deterioration of concrete in structures
2. Equip student with concepts of NDT and evaluation
3. Understand failures and causes for failures in structures
4. Familiarize different materials and techniques for repairs
5. Understand procedure to carryout Physical evaluation of buildings and prepare report.

Course Outcomes:
At the end of this course the student will be able to
a. Explain deterioration of concrete in structures
b. Carryout analysis using NDT and evaluate structures
c. Assess failures and causes of failures in structures
d. Carryout Physical evaluation and submit report on condition of the structure.

SYLLABUS:

UNIT - I

UNIT- II
Non Destructive Testing- Non destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting-Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.
UNIT-III

**Failure of buildings:** Definition of building failure-types of failures- Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage - Methodology for investigation of failures-diagnostic testing methods and equipments-repair of cracks in concrete

UNIT-IV


UNIT: V

**Repair Techniques:** Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes.

UNIT: VI

**Investigation of structures:** Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

**TEXT BOOKS:**

2. ‘Rehabilitation of Concrete Structures’ by B. Vidivelli, Standard Publishers.
3. ‘Concrete Bridge Practice Construction, Maintenance & Rehabilitation’ by V. K. Raina.

**REFERENCES:**

1. ‘Concrete Structures- protection Repair and Rehabilitation’ by R. Doodge Woodson, BH Publishers
CE804 (d) - WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT

(Elective-IV)

Lecture : 3 hrs/Week  Internal Assessment : Marks
Tutorial : 1 Hrs/Week  Semester End Examination : Marks
Practical : --  Credits : 3

Course Learning Objectives:
The course is designed to
1. introduce the concepts of system analysis in the planning, design, and operation of water resources.
2. appreciate mathematical optimization methods and models.
3. learn and apply basic economic analysis tools to water resources projects.
4. understand linear, nonlinear and dynamic programming techniques and apply them to various water resources systems planning and design problems.
5. appreciate simulation and management techniques in water resources systems.

Course Outcomes
At the end of the course the student will be able to
a. apply optimization methods to solve problems related to water resource systems.
b. perform basic economic analysis to evaluate the economic feasibility of water resources projects
c. formulate optimization models for decision making in water resources systems.
d. use simulation models for planning and design of Water Resources Systems.

SYLLABUS:

UNIT – I
Introduction: Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.
UNIT – II
Linear programming: Formulation of linear programming models, graphical method, simplex method, application of linear programming in water resources, revised simplex method, duality in linear programming, sensitivity analysis.

UNIT – III
Dynamic programming: Principles of optimality, forward and backward recursive dynamic programming, curse of dimensionality, application for resource allocation.

UNIT – VI
Non-linear optimization techniques: Classical optimization techniques, Lagrange methods, Kuhn-Tucker conditions, Search techniques, overview of Genetic Algorithm

UNIT – V
Water Resources Economics: Basics of engineering economics, economic analysis, conditions of project optimality, benefit and cost analysis

UNIT – VI
Simulation and management: Application of simulation techniques in water resources, planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

TEXT BOOKS:

REFERENCES:
CE804 (e) - URBAN TRANSPORTATION PLANNING
(Elective-IV)

<table>
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<tbody>
<tr>
<td>The objective of this course is:</td>
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<tr>
<td>1. To learn various procedures for travel demand estimation.</td>
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<td>2. To various data collection techniques for OD data.</td>
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<td>3. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.</td>
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<tr>
<td>4. To develop alternative urban transport network plans.</td>
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<table>
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<tr>
<th>Course Outcomes:</th>
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<tbody>
<tr>
<td>At the end of course, Student can</td>
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<tr>
<td>a. Estimate travel demand for an urban area.</td>
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<td>b. Plan the transportation network for a city.</td>
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<td>c. Identify the corridor and plan for providing good transportation facilities.</td>
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<td>d. Evaluate various alternative transportation proposals.</td>
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</table>

SYLLABUS:

UNIT -I

UNIT -II
UNIT -III


UNIT -IV

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNIT -V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

UNIT -VI

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

TEXT BOOKS:


REFERENCES:

2. ‘Introduction to Transportation Planning’ by Bruton M.J., Hutchinson of London.
3. ‘Metropolitan Transportation Planning’ by Dicky, J.W., Tata McGraw Hill.

***
CE804 (f) - SAFETY ENGINEERING
(Elective-IV)

Lecture : 3 hrs/Week  Internal Assessment : 30 Marks
Tutorial : 1 Hrs/Week  Semester End Examination : 70 Marks
Practical : --  Credits : 3

Course Learning Objectives:
1. To import concepts of safety w.r.t construction Industry
2. To understands various hazards in construction industry and preventive measures
3. To learn safety operation of construction machinery
4. To learn techniques to distinguish civil structures safety
5. To understand fire safety principles

Course Outcomes:
Students will have ability to
a. Develop management plans to prevent accidents in construction industry.
b. Prepare plans to safe guard workers in construction of high risk buildings.
c. Ensure safety while operating construction machinery
d. Outline safety plans for demolition of buildings
e. Prepare fire safety plans for a given building

SYLLABUS:
UNIT-I

UNIT-II
Hazards Of Construction And Prevention : Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold inspection checklist – false work – erection of structural frame work,

UNIT-III

Working At Heights: Fall protection in construction OSHA 3146 – OSHA requirement for working at heights, Safe access and egress – safe use of ladders- Scaffoldings , requirement for safe work platforms, stairways, gangways and ramps – fall prevention and fall protection , safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems – working on fragile roofs, work permit systems, height pass – accident case studies.

UNIT-IV


UNIT-V

Safety In Demolition Work : Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition - Indian standard - trusses, girders and beams – first aid – fire hazards and preventing methods – interesting experiences at the construction site against the fire accidents.

UNIT-VI


TEXT BOOKS:

2. ‘Reliability Maintenance and Safety Engineering, by Gupta A K, Laxmi Publications, New Delhi.'

REFERENCES:


***
CE804 (g) - BRIDGE ENGINEERING

(Elective-IV)

Lecture : 3 hrs/Week Internal Assessment : 30 Marks
Tutorial : 1 Hrs/Week Semester End Examination 70 Marks
Practical : -- Credits : 3

Course Learning Objectives:
The objective of this course is:

1. Familiarize Students with different types of Bridges and IRC standards.
2. Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and maintenance.

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

a. Explain different types of Bridges with diagrams and Loading standards
b. Carryout analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
c. Carryout analysis and design of Plate girder bridges
d. Organize for attending inspections and maintenance of bridges and prepare reports.

SYLLABUS:

UNIT-I
Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading.

UNIT-II
Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of
slab- Guyon’s – Massonet Method –Hendry- Jaegar Methods- Courbon’s theory- Pigeaud’s method.

UNIT-III
T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing.

UNIT-IV
Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

UNIT-V
Box Culverts: Loading –Analysis and Design- Reinforcement detailing.

UNIT-VI

TEXT BOOK
1. ‘Essentials of Bridge Engineering’ by Jhonson Victor D
2. ‘Design of Bridge Structures’ by T. R. Jagadeesh, M.A. Jayaram, PHI

REFERENCES:
1. ‘Design of Concrete Bridges’ by Aswini, Vazirani, Ratwani.
2. ‘Design of Steel Structures’ by B. C. Punmai, Jain & Jain, Lakshmi Publications.
3. ‘Design of Bridges’ by Krishna Raju.

INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

***
IV Year – II SEMESTER

CE805-PROJECT WORK

Contact Hours : 9 hrs/Week  
Internal Assessment : 60 Marks

Tutorial : ---  
Semester End Examination : 140 Marks

Practical : ---  
Credits : 9

The main objective of the Project work is

a. To enable the student apply engineering knowledge that has been taught all through the programme for solving practical engineering problem.

b. To enable the student capable for problem solving / problem shooting.

c. To instill and inculcate team spirit/ team work in to the minds of the students.

d. To enable/ train the students report making/ documentation.

e. To provide students an opportunity to use any civil engineering software for their project work.

Out comes of the Project work.

Up on completion of the Project work, the student will be able to

1. Apply all levels of Engineering knowledge in solving the Engineering problems.

2. Work together with team spirit.

3. Use Civil Engineering software at least one.

4. Document the projects
ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

For
COMPUTER SCIENCE AND ENGINEERING FOUR DEGREE COURSE
(Applicable for batches admitted from 2013-2014)
## COURSE STRUCTURE

### I Year – I SEMESTER

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**Total Credits** 24

### I Year – II SEMESTER

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**Total Credits** 24

### II Year – I SEMESTER

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II Year – II SEMESTER

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Total Credits 21

III Year – I SEMESTER

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Total Credits 24

III Year – II SEMESTER

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Total Credits 21

IV Year – I SEMESTER

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<td><strong>21</strong></td>
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</table>

**IV Year – II SEMESTER**

Elective – I:
i) Software Testing Methodologies
ii) Simulation Modeling
iii) Information Retrieval Systems
iv) Artificial Intelligence
v) Multimedia Computing
vi) High Performance Computing

Elective – II:
i. Digital Forensics
ii. Hadoop and Big Data
iii. Software Project Management
iv. Machine Learning
v. Advanced Databases

Elective – III:
i) Human Computer Interaction
ii) Advanced Operating Systems
iii) Mobile Adhoc & Sensor Networks
iv) Pattern Recognition
v) Digital Image Processing
vi) Micro Processors and Multi Core Systems

Elective-IV:
i) Embedded and Real Time Systems
ii) Neural Networks & Soft Computing
iii) Social Networks and the Semantic Web
iv) Cloud Computing
SYLLABUS
I Year – I SEMESTER

ENGLISH –I
(Common to All Branches)

DETAILED TEXT-I English Essentials: Recommended Topics:

1. IN LONDON: M.K.GANDHI
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME:** The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM
   **OBJECTIVE:** To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE
   **OBJECTIVE:** This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:
   **OBJECTIVE:** To inform the learners how to write clearly and logically.
   **OUTCOME:** The learner will be able to think clearly and logically and write clearly and logically.

5. MAN’S PERIL
   **OBJECTIVE:** To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS
   **OBJECTIVE:** This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   **OUTCOME:** This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. LUCK—MARK TWAIN
   **OBJECTIVE:** This is a short story about a man’s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.
   **OUTCOME:** The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book:** ‘English Essentials’ by Ravindra Publications
1. G.D.Naidu
   OBJECTIVE: To inspire the learners by G.D.Naidu’s example of inventions and contributions.
   OUTCOME: The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. G.R.Gopinath
   OBJECTIVE: To inspire the learners by his example of inventions.
   OUTCOME: Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. Sudhamurthy
   OBJECTIVE: To inspire the learners by the unique interests and contributions of Sudha Murthy.
   OUTCOME: The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. Vijay Bhatkar
   OBJECTIVE: To inspire the learner by his work and studies in different fields of engineering and science.
   OUTCOME: The learner will emulate him and produce memorable things.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, $\sin ax$, $\cos ax$, polynomials in $x$, $e^{ax} V(x)$, $xV(x)$.
Applications: LCR circuit, Simple Harmonic motion
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac’s delta function- Inverse Laplace transforms– Convolution theorem (without proof).
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV 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.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.
Subject Category
ABET Learning Objectives a c e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions—solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables
Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation B E
Books:

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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</thead>
</table>
| Theory           | a) Apply knowledge of math, science, & engineering  
b) Design & conduct experiments, analyze & interpret data  
c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints  
d) Function on multidisciplinary teams  
e) Identify, formulate, & solve engineering problems  
f) Understand professional & ethical responsibilities  
g) Communicate effectively  
h) Understand impact of engineering solutions in global, economic, environmental, & societal context  
i) Recognize need for & be able to engage in lifelong learning  
j) Know contemporary issues  
k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests  
2. Essay questions tests  
3. Peer tutoring based  
4. Simulation based  
5. Design oriented  
6. Problem based  
7. Experiential (project based) based  
8. Lab work or field work based  
9. Presentation based  
10. Case Studies based  
11. Role-play based  
12. Portfolio based | A. Questions should have:  
B. Definitions, Principle of operation or philosophy of concept.  
C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.  
D. Design oriented problems  
E. Trouble shooting type of questions  
F. Applications related questions  
G. Brain storming questions |
UNIT-I: WATER TECHNOLOGY
Objectives : For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

UNIT-II : ELECTROCHEMISTRY
Objectives : Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

UNIT-III : CORROSION
Objectives : the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

UNIT-IV : HIGH POLYMERS
Objectives : Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V : FUELS
Objectives : A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS
Objectives : With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.
TEXT BOOKS

REFERENCES
ENGINEERING MECHANICS

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work-energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

UNIT – III
Objectives: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion

TEXT BOOKS:

REFERENCES:
COMPUTER PROGRAMMING

Objectives: Formulating algorithmic solutions to problems and implementing algorithms in C

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts,
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling( gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
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 for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: 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 multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs
Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Ritchie and Brian Kernighan

Reference Books and web links:
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge
ENVIRONMENTAL STUDIES

Course Learning Objectives:
The objectives of the course is to impart
1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on
1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

Syllabus:

UNIT - I


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II

Natural Resources: Natural resources and associated problems
Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people
Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III


UNIT - IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - V


UNIT - VI

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi

Reference:
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop Singh: Acme Learning, New Delhi
ENGINEERING CHEMISTRY LABORATORY

List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na₂CO₃ solutions
3. Estimation of KMnO₄ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K₂Cr₂O₇ solution.
5. Estimation of Copper using standard K₂Cr₂O₇ solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKS

Suggested Lab Manuals:
OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

BASIC COMMUNICATION SKILLS

UNIT 1  A. Greeting and Introductions
        B. Pure Vowels
UNIT 2  A. Asking for information and Requests
        B. Diphthongs
UNIT 3  A. Invitations
        B. Consonants
UNIT 4  A. Commands and Instructions
        B. Accent and Rhythm
UNIT 5  A. Suggestions and Opinions
        B. Intonation

Text Book:
‘Strengthen your Communication Skills’ Part-A by Maruthi Publications

Reference Books:
1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi)
C PROGRAMMING LAB

Exercise 1
a) Write a C Program to calculate the area of triangle using the formula
   \[ \text{area} = \frac{1}{2} \sqrt{s(s-a)(s-b)(s-c)} \]
   where \( s = \frac{(a+b+c)}{2} \)
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2
a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits
   after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s
   complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator form the user, performs the
   operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Exercise 3
a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the
   given number.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1.
   Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to
   generate the first \( n \) terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and \( n \), where \( n \) is a value supplied by the
   user.

Exercise 4
a) Write a C Program to print the multiplication table of a given number \( n \) up to a given value, where \( n \) is
   entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that
   number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a liner search.
c) Write a C program to implement binary search

Exercise 6
a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two \( m \times n \) matrices, check the compatibility and perform addition and
   multiplication of them

Exercise 7
Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string in to given main string from a given position.
   ii. To delete \( n \) Characters from a given position in a given string.
   iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:
   i) Reading a complex number   ii) Writing a complex number
   iii) Addition of two complex numbers   iv) Multiplication of two complex numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions
   - to concatenate two strings
   - to append a string to another string
   - to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions
   - to find the length of a string
to find whether a given string is palindrome or not

**Exercise 11**

a) Write a C functions to find both the largest and smallest number of an array of integers.
b) Write C programs illustrating call by value and call by reference concepts.

**Exercise 12**
Write C programs that use both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To find Fibonacci sequence

**Exercise 13**

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers

**Exercise 14**

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.
b) Write a C program to swap two numbers using pointers

**Exercise 15**
Examples which explore the use of structures, union and other user defined variables

**Exercise 16**

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.
ENGLISH –II
(Common to All Branches)

DETAILED TEXT-II : Sure Outcomes: English for Engineers and Technologists Recommended Topics

1. TECHNOLOGY WITH A HUMAN FACE
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME:** The proposed technology is people’s technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
   **OBJECTIVE:** To make the learner understand how the unequal heating of earth’s surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME:** The learner’s understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
   **OBJECTIVE:** To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME:** The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
   **OBJECTIVE:** To inform the learner of the various advantages and characteristics of water.
   **OUTCOME:** The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
   **OBJECTIVE:** In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME:** The students will learn to work hard with devotion and dedication.

6. WORK BRINGS SOLACE
   **OBJECTIVE:** In this lesson Abdul Kalam highlights the advantage of work.
   **OUTCOME:** The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.


NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

5. J.C. Bose
   **OBJECTIVE:** To apprise of J.C.Bose’s original contributions.
   **OUTCOME:** The learner will be inspired by Bose’s achievements so that he may start his own original work.

6. Homi Jehangir Bhaba
   **OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.
   **OUTCOME:** The learner will be inspired by Bhabha’s achievements so as to make his own experiments.

7. Vikram Sarabhai
   **OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   **OUTCOME:** The learner will realize that development is impossible without scientific research.

   **OBJECTIVE:** To expose the reader to the pleasure of the humorous story
   **OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:
(One variable and Simultaneous Equations)
Subject Category
ABET Learning Objectives  a e k
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT II Interpolation:
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward
differences –Central differences – Symbolic relations and separation of symbols-Differences of a
polynomial-Newton’s formulae for interpolation – Interpolation with unevenly spaced points - Lagrange’s
Interpolation formula
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT III Numerical solution of Ordinary Differential equations:
Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta
Methods
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-
range sine and cosine series
application: Amplitude, spectrum of a periodic function
Subject Category
ABET Learning Objectives  a e d
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT V Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms –
properties – inverse transforms – Finite Fourier transforms
Subject Category
ABET Learning Objectives  a d e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT VI Z-transform:
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z
transform- -Convolution theorem – Solution of difference equation by Z -transforms.
Subject Category
ABET Learning Objectives  a b e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E
**BOOKS:**
2. DEAN G. DUFFY, Advanced Engineering Mathematics with MATLAB, CRC Press
3. V.RAVINDRANATH and P. VIJAYALAXMI, Mathematical Methods, Himalaya Publishing House

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<td>Theory Design</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
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<tr>
<td>Design Analysis</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<td>Algorithms</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Drawing Others</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<td></td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<tr>
<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td></td>
<td></td>
<td>12. Portfolio based</td>
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</tr>
</tbody>
</table>
UNIT I Linear systems of equations:
Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination -
Gauss Jordon and Gauss Seidal Methods.
Application: Finding the current in a electrical circuit.
Subject Category
ABET Learning Objectives   a e k
ABET internal assessments 1 2 6 4
JNTUK External Evaluation A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by
using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank -
Positive, negative definite - semi definite - index – signature.
Application: Free vibration of a two-mass system.
Subject Category
ABET Learning Objectives   a d e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing ( Cartesian - Polar and Parametric curves)-
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
Application: Moments of inertia
Subject Category
ABET Learning Objectives   a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of
improper integrals
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives   a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives   a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Vector Integration:
Line integral – work done – Potential function – area- surface and volume integrals Vector integral
theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.
application: work done, Force
Subject Category
ABET Learning Objectives   a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E
**BOOKS:**

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td></td>
<td>A. Questions should have:</td>
</tr>
<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td></td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
</tr>
<tr>
<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td></td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
</tr>
<tr>
<td>Algorithms</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td></td>
<td>D. Design oriented problems</td>
</tr>
<tr>
<td>Drawing</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td></td>
<td>E. Trouble shooting type of questions</td>
</tr>
<tr>
<td>Others</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td></td>
<td>F. Applications related questions</td>
</tr>
<tr>
<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td></td>
<td>G. Brain storming questions</td>
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<tr>
<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<tr>
<td></td>
<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td></td>
<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
<td></td>
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<tr>
<td></td>
<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td></td>
<td></td>
<td>12. Portfolio based</td>
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</tbody>
</table>
ENGINEERING PHYSICS

UNIT-I
PHYSICAL OPTICS FOR INSTRUMENTS
“Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics”


UNIT-II
COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS
Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.


X-RAY DIFFRACTION TECHNIQUES: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg’s law.

UNIT-III
MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY
“Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve


SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London’s equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV
ACOUSTICS AND EM – FIELDS:
Objective: The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

ACOUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

ELECTRO-MAGNETIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations (Calculus approach).

UNIT – V
QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT
Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.


UNIT – VI
SEMICONDUCTOR PHYSICS:
Objective: In the wake of ever increasing demand for the space and power the watch word “small is beautiful”, understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.

TEXT BOOKS
1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers )

REFERENCE BOOKS
1. ‘Introduction to solid state physics’ by Charles Kittle (Willey India Pvt.Ltd)
2. ‘Applied Physics’ by T. Bhimasenkaram (BSP BH Publications )
3. ‘Applied Physics’ by M.Arumugam (Anuradha Agencies)
4. ‘Engineering Physics’ by Palanisamy (Scitech Publishers )
5. ‘Engineering Physics’ by D.K.Bhattacharya (Oxford University press)
6. ‘Engineering Physics’ by Mani Naidu S (Pearson Publications)
7. ‘Engineering Physics’ by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. ‘Engineering Physics’ by B.K.Pandey & S. Chaturvedi (Cengage Learning )
UNIT I: Human Values:

UNIT II: Engineering Ethics:

UNIT III: Engineering as Social Experimentation:

UNIT IV: Engineers’ Responsibility for Safety and Risk:

UNIT V: Engineers’ Responsibilities and Rights:

UNIT VI: Global Issues:

Text Books:
2. “Professional Ethics and Morals” by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications
3. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications
4. “Professional Ethics and Human Values” by Prof.D.R.Kiran-
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication
ENGINEERING DRAWING

**Objective:** Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**UNIT I**
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

**UNIT II**
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

**UNIT III**
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

**UNIT IV**
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.
Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V**
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI**
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**TEXT BOOKS:**
1. Engineering Drawing by N.D. Butt, Chariot Publications

**REFERENCE BOOKS:**
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6  Body language
UNIT 7  Dialogues
UNIT 8  Interviews and Telephonic Interviews
UNIT 9  Group Discussions
UNIT 10  Presentation Skills
UNIT 11  Debates

Text Book:

‘Strengthen your Communication Skills’ Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi)
List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of stretched string – Sonometer.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect for semiconductor.

REFERENCE:
1. Engineering Physics Lab Manual by Dr. Y. Aparna & Dr. K. Venkateswarao (V.G.S.Book links)
List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in
ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP:
Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

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

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

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

Productivity tools Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools
(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware

Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

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

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

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

Task 5:
Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

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

Internet & Networking Infrastructure


Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette: Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

Word


Excel

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

LOOKUP/VLOOKUP

Task 12: Performance Analysis - Features to be covered: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

Power Point

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.
TEXT BOOK:
Faculty to consolidate the workshop manuals using the following references
1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller’s Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.

REFERENCE BOOK:
1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting)  
Introduction to Managerial Economics and demand Analysis:  
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)  
Production and Cost Analyses:  
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III: (*The Learning Objective of this Unit is to understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)  
Introduction to Markets, Theories of the Firm & Pricing Policies:  
(** One has to understand the nature of different markets and Price Output determination under various market conditions)

Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)  
Types of Business Organization and Business Cycles:  
(**One should equipped with the knowledge of different Business Units)

Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)  
Introduction to Accounting & Financing Analysis:  
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)  
(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

Unit – VI: (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)  
(*The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making*)

Note: *Learning Objective

**Learning Assessment

TEXT BOOKS

REFERENCES:
1. V. Maheswari: Managerial Economics, Sultan Chand.
OBJECT-ORIENTED PROGRAMMING THROUGH C++

Objectives: Expertise in object oriented principles and their implementation in C++

UNIT I:
Objectives: Exposure to basics of object oriented mode, C++ programming and I/O in C++
INPUT AND OUTPUT IN C++:
Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data, Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators

UNIT II:
Objectives: Focus on Basic concept in C++ programming, Operators, control structures, functions, overloading, recursion
Tokens In C++, Variable Declaration And Initialization, Data Types, Operators In C And C++, Scope AccessOperator, Namespace, Memory Management Operators, Comma Operator, Revision Of Decision Statements, Control Loop Statements
FUNCTIONS IN C++:

UNIT III:
Objectives: Acquaintance with classes, objects and member functions
CLASSES AND OBJECTS:
Introduction, Classes In C++, Declaring Objects, Access Specifiers And Their Scope, Member Functions, Outside Member Function As Inline, Data Hiding or Encapsulation, Classes, Objects and Memory, Static Member Variables, Static Member Functions Static Object, Array Of Objects, Objects As Function Arguments, Friend Functions, The Const Member Functions, The Volatile Member Function, Recursive Member Function, Local Classes, Empty, Static And Const Classes, Member Function and Non-Member Function, Overloading Member Functions, Nested Class

UNIT IV:
Objectives: Focus on constructors, destructors, variants in them, operator overloading, type conversions
CONSTRUCTORS AND DESTRUCTORS:
Introduction, Characteristic Of Constructors & Destructors, Applications With Constructors, Parameterized Constructor, Overloading Constructors (Multiple Constructors), Array Of Objects Using Constructors, Constructors With Default Arguments, Copy Constructors, The Const Objects, Destructors, Calling Constructors And Destructors, Qualifier And Nested Classes, Anonymous Objects, Private Constructors And Destructors, Dynamic Initialization Using Constructors, Dynamic Operators and Constructors, Recursive Constructor, Constructor and Destructor With Static Members, Local Vs. Global Object
OPERATOR OVERLOADING AND TYPE CONVERSION:
Introduction, Overloading Unary Operators, Constraint on Increment And Decrement Operators, Overloading Binary Operators, Overloading With Friend Function, Overloading Assignment Operator (=), Type Conversion, Rules For Overloading Operators, One Argument Constructor And Operator Function, Overloading Stream Operators

UNIT V:
Objective: Concentration on inheritance, types of inheritance, polymorphism, virtual functions
INHERITANCE:
Introduction, Reusability, Access Specifiers And Simple Inheritance, Protected Data With Private Inheritance, Types Of Inheritances(Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Multipath Inheritance), Virtual Base Classes, Constructors, Destructors, And Inheritance, Object As A Class Member, Abstract Classes, Qualifier Classes And Inheritance, Constructor In Derived Class, Pointers And Inheritance, Overloading Member Function, Advantages Of Inheritance, Disadvantages Of Inheritance.
BINDING, POLYMORPHISM AND VIRTUAL FUNCTIONS: Introduction, Binding In C++, Static (Early) Binding, Dynamic (Late) Binding, Pointer To Base And Derived Class Objects, Virtual Functions, Rules For Virtual Functions, Array Of Pointers, Pure Virtual Functions, Abstract Classes, Working Of Virtual Functions, Virtual Functions In Derived Classes, Object Slicing, Constructors And Virtual Functions, Virtual Destructors, Destructor And Virtual Functions.

UNIT VI:
Objectives: Focus on Files, File operations, generic programming, templates, function templates, Exception handling
APPLICATIONS WITH FILES: Introduction, File Stream Classes, File Opening Modes, File Pointers And Manipulators, Manipulators With Arguments, Sequential Access Files, Binary And ASCII Files random Access Operation,
GENERIC PROGRAMMING WITH TEMPLATES: Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates, Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates And Inheritance, Container Classes , Types Of Containers, Container Adaptors, Iterators
EXCEPTION HANDLING: Introduction, Principles Of Exception Handling, The Keywords Try, Throw And Catch, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-Throwing Exception, Specifying Exception, Exceptions In Constructor And Destructors, Controlling Uncaught Exceptions, Class Template With Exception Handling

TEXT BOOKS:
2. Object Oriented Programming C++, Joyce Farrell, Cengage
3. Mastering C++, Venugopal, Rajkumar, Ravi Kumar TMH
4. Object Oriented Programming with C++, 2nd ed, Sourav Sahay, OXFORD

REFERENCE BOOKS:
1. The Complete Reference, C++, 4ed, Herbert Schildt, TMH
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Objectives: Acquaintance with the basic mathematical implication for computer science, applications of mathematics in computer science

UNIT I:
Objective: Acquiring the relevance of statements, inferences and predicates in computer science

Mathematical Logic:

Predicate calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

UNIT II:
Objective: Overview of number theory, basic algorithms in number theory and mathematical induction

Number Theory & Induction:
Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat’s Theorem and Euler’s Theorem)

Mathematical Induction: Principle of Mathematical Induction, exercises

UNIT III:
Objective: Focuses on sets and relations and their operations, relations and functions

Set Theory:
Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion


Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions

UNIT IV:
Objectives: Exposure of graphs, their representation, types, trees and tree variants

Graph Theory:
Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs)

Planar Graphs, Euler’s Formula, Graph Colouring and Covering, Chromatic Number,( Problems and Theorems without proofs)

Trees, Directed trees, Binary Trees, Decision Trees,


UNIT V:
Objective: Overview of algebraic structures, Group theory, Binomial theorem, permutations and combinations

Algebraic Structures: Lattice:
Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Groups: Abelian Group, Cosets, Subgroups (Definitions and Examples of all Structures) Algebraic Systems with two Binary Operations: Rings

Combinatorics:

Binomial Theorem:

UNIT VI:
Objective: Overview of generating functions, recurrence relations and solving recurrence relations
**Recurrence Relation:**
Generating Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions
Recurrence Relations, Formulation as Recurrence Relations, Solving linear homogeneous recurrence
Relations by substitution, generating functions and The Method of Characteristic Roots.
Solving Inhomogeneous Recurrence Relations

**TEXT BOOKS:**
1. Discrete Mathematical Structures with Applications to Computer Science, Tremblay, Manohar, TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, Mott, Kandel, Baker, PHI
3. Discrete Mathematics, Swapan Kumar chakrborthy, Bikash kanti sarkar, OXFORD
6. Discrete mathematics and Graph theory, 3rd ed, Biswal, PHI

**REFERENCE BOOKS:**
2. Discrete Mathematics, S.Santha, Cengage
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
4. Discrete Mathematics,2/e, JK Sharma ,Macmillan
DIGITAL LOGIC DESIGN

UNIT I: Number Systems
Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers From One Radix To Another Radix, r's Complement and (r-1)'s Complement Subtraction of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non weighted codes

UNIT II: Logic Gates And Boolean Algebra
Basic Gates NOT, AND, OR, Boolean Theorms, Complement And Dual of Logical Expressions, Universal Gates, Ex-Or and Ex-Nor Gates, SOP, POS, Minimizations of Logic Functions Using Boolean Theorems, Two level Realization of Logic Functions Using Universal Gates

UNIT III: Combinational Logic Circuits

UNIT IV: Introduction to Sequential Logic Circuits

UNIT V: Registers and Counters
Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter.

UNIT VI: Introduction to Programmable Logic Devices (PLOs)
PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM.
TEXT BOOKS:
1. Digital Design, 4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
REFERENCE BOOKS
2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Modern Digital Electronics, R.P. Jain, TMH
DATA STRUCTURES

Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications

UNIT I:
Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques
Preliminaries of algorithm, Algorithm analysis and complexity,
Data structure- Definition, types of data structures
Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion
List Searches using Linear Search, Binary Search, Fibonacci Search
Sorting Techniques: Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort ) and merging (merge sort ) Algorithms.

UNIT II:
Objectives: Applying stack and queue techniques for logical operations
Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.
Queues: Basic Queue Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack,
Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

UNIT III:
Objectives: Exposure to list representation models in various types of applications
Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

UNIT IV:
Objectives: Implementation of tree implementation in various forms
Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree, Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

UNIT V:
Objectives: Advanced understanding of other variants of trees and their operations
Advanced concepts of Trees: Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

UNIT VI:
Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees
Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms
Graph Traversals (BFS & DFS), applications: Dijkstra’s shortest path, Transitive closure, Minimum Spanning Tree using Prim’s Algorithm, warshall’s Algorithm(Algorithmic Concepts Only, No Programs required).

TEXT BOOKS:
1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C, Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss
REFERENCE BOOKS:

2. Classic Data Structures, 2/e, Debasis Samanta, PHI, 2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Press
OBJECT-ORIENTED PROGRAMMING LAB

1. Write a C++ program illustrating Variable Scope.
2. Write a C++ program illustrating Swap integer values by reference.
3. Write a C++ program illustrating Checking whether the number is even or odd using Ternary operator.
4. Write a C++ program illustrating a program to find the roots of a quadratic equation. Use switch statements to handle different values of the discriminant \((b^2-4*a*c)\).
5. Write a C++ program illustrating interactive program to multiply 2 variables after checking the compatibility.
6. Write a C++ program illustrating interactive program for computing the roots of a quadratic equation by handling all possible cases. Use streams to perform I/O operations.
7. Write a C++ program illustrating to sort integer numbers.
8. Write a C++ program illustrating factorial using recursion.
9. Write a C++ program illustrating pass by value, pass by reference, pass by address.
10. Write a C++ program illustrating Function overloading.
11. Write a C++ program illustrating an interactive program for swapping integer, real, and character type variables without using function overloading. Write the same program by using function overloading features and compare the same with its C counterpart.
12. Write a C++ program illustrating inline functions.
13. Write a C++ program illustrating Friend function.
14. Write a C++ program illustrating Exception handling.
15. Write a C++ program illustrating Function template.
16. Write a C++ program illustrating Overloading increment, decrement, binary+&<< operator.
17. Write a C++ program illustrating Virtual function.
18. Write a C++ program illustrating an interactive program to process complex numbers. It has to Perform addition, subtraction, multiplication, and division of complex numbers. print results in x+iy form. Create a class for the complex number representation.
19. Write a C++ program illustrating user defined string processing functions using pointers (string length, string copy, string concatenation)
20. Write a C++ program illustrating Constructor overloading (Both parameterised and default).
21. Write a C++ program illustrating Copy constructor.
22. Write a C++ program illustrating access data members & member functions using ‘THIS’ pointer.
23. Write a C++ program illustrating for overloading ++ operator to increment data.
24. Write a C++ program illustrating overloading of new and delete operator.
25. Write a C++ program illustrating Abstract classes.
26. Write a C++ program illustrating Inheritance (Multiple, Multilevel, Hybrid).
27. Write a C++ program illustrating Virtual classes & virtual functions.
28. Write a C++ program illustrating overloading function template.
29. Write a C++ program illustrating Class template.
DATA STRUCTURES LAB

Exercise 1:
Write recursive program which computes the \( n \)th Fibonacci number, for appropriate values of \( n \).
Analyze behavior of the program Obtain the frequency count of the statement for various values of \( n \).

Exercise 2:
Write recursive program for the following

a) Write recursive and non recursive C program for calculation of Factorial of an integer
b) Write recursive and non recursive C program for calculation of GCD (n, m)
c) Write recursive and non recursive C program for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:

a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise 4:

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order

Exercise 5:

a) Write C program that implement heap sort, to sort a given list of integers in ascending order
b) Write C program that implement radix sort, to sort a given list of integers in ascending order
c) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:

a) Write C program that implement stack (its operations) using arrays
b) Write C program that implement stack (its operations) using Linked list

Exercise 7:

a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
a) Write C program that implement Queue (its operations) using arrays.
b) Write C program that implement Queue (its operations) using linked lists

Exercise 8:

a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:

a) Adding two large integers which are represented in linked list fashion.
b) Write a C program to reverse elements of a single linked list.
c) Write a C program to store a polynomial expression in memory using linked list
d) Write a C program to representation the given Sparse matrix using arrays.
e) Write a C program to representation the given Sparse matrix using linked list

Exercise10:

a) Write a C program to Create a Binary Tree of integers
b) Write a recursive C program for Traversing a binary tree in preorder, inorder and postorder.
c) Write a non recursive C program for Traversing a binary tree in preorder, inorder and postorder.
d) Program to check balance property of a tree.

Exercise 11:

a) Write a C program to Create a BST
b) Write a C program to insert a node into a BST.
c) Write a C program to delete a node from a BST.
List of Experiments:

1) Verification of Basic Logic Gates.
2) Implementing all individual gates with Universal Gates NAND & NOR.
3) Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
4) Design a Combinational Logic circuit for 4x1 MUX and verify the truth table.
5) Design a Combinational Logic circuit for 1x4 De-MUX and verify the truth table.
6) Verify the *data read* and *data write* operations for the IC 74189.
7) Design a Gray code encoder and interface it to SRAM IC 74189 for write operation display on 7-segment.
8) Design a Gray code De-coder and interface it to SRAM IC 74189 for read operation display it on 7-segment.
9) Construct Half Adder and Full Adder using Half Adder and verify the truth table.
10) Verification of truth tables of the basic Flip-Flops with *Synchronous* and *Asynchronous* modes.
11) Implementation of Master Slave Flip-Flop with J-K Flip-Flop and verify the truth table for *race around* condition.
12) Design a Decade Counter and verify the truth table.
13) Design the Mod 6 counter using D-Flip-Flop.
14) Construct 4-bit ring counter with T-Flip-Flop and verify the truth table.
15) Design a 8–bit right Shift Register using D-Flip-Flop and verify the truth table.
PROBABILITY AND STATISTICS
(Common to CE, CSE, IT, Chemical, PE, PCE, Civil Branches)

UNIT I Random variables and Distributions:
Introduction- Random variables- Distribution function- Discrete distributions (Review of Binomial and Poisson distributions)-
Continuous distributions: Normal, Normal approximation to Binomial distribution, Gamma and Weibull distributions

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Tests of Hypothesis:
Introduction - Type I and Type II errors - Maximum error - One tail, two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test - ANOVA for one-way and two-way classified data

Subject Category
ABET Learning Objectives a b d e h k
ABET internal assessments 1 2 6 7 10
JNTUK External Evaluation A B D E F

UNIT V Curve fitting and Correlation:
Introduction - Fitting a straight line – Second degree curve - Exponential curve - Power curve by method of least squares.

Simple Correlation and Regression - Rank correlation - Multiple regression

Subject Category
ABET Learning Objectives a d e h k
ABET internal assessments 1 2 6 10
JNTUK External Evaluation A B E

UNIT VI Statistical Quality Control Methods:

Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E F

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

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
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<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<td>Algorithms</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<tr>
<td>Drawing</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td>Others</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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Objective: Implementing programs for user interface and application development using core java principles

UNIT I:
Objective: Focus on object oriented concepts and java program structure and its installation
Introduction to OOP
Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II:
Objective: Comprehension of java programming constructs, control structures in Java
Programming Constructs
Variables, Primitive Datatypes, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching, Conditional, loops,
Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III:
Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling
Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class
Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package
Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

UNIT IV:
Objective: Understanding of Thread concepts and I/O in Java
MultiThreading : java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Synchronization, suspending and Resuming threads, Communication between Threads
Input/Output: reading and writing data, java.io package

UNIT V:
Objective: Being able to build dynamic user interfaces using applets and Event handling in java
Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()
Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes

UNIT VI:
Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them
Abstract Window Toolkit
Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar
Swing:
Introduction, JFrame, JApplet, JPanel, Components in swing, Layout Managers, JList and JScrollBar, Split Pane, JTabbedPane, Dialog Box
Pluggable Look and Feel
TEXT BOOKS:
1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavvar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson

REFERENCE BOOKS:
1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
ADVANCED DATA STRUCTURES
(Note: C++ and Java implementation is not included in the syllabus)

Objectives: Exposed to hashing approaches, variants of trees, heaps, queues, implementation of
graph algorithms, analysis of sorting algorithms with respect to bounds and file organizations and
operations
UNIT I:
Objectives: Comprehensive understanding of dictionaries, hashing mechanism which supports faster
retrieval and skip lists
Dictionaries: Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods),
Hashing Functions( Division Method, Multiplication Method, Universal Hashing), Skip Lists, Analysis of
Skip Lists. (Reference 1)
UNIT II:
Objectives: Illustration of Balanced trees and their operations
AVL Trees: Maximum Height of AVL Tree, Insertions and Deletions. 2-3 Trees: Insertion, Deletion.
UNIT III:
Objectives: Comprehension of heaps, queues and their operations
Priority Queues: Binary Heaps: Implementation of Insert and Delete min, Creating Heap.
 Binomial Queues: Binomial Queue Operations, Binomial Amortized Analysis, Lazy Binomial Queues
UNIT IV:
Objectives: Detailed knowledge of nonlinear data structures and various algorithms using them
Graph algorithms: Minimum-Cost Spanning Trees- Prim's Algorithm, Kruskal's Algorithm Shortest Path
Algorithms: Dijkstra's Algorithm, All Pairs Shortest Paths Problem: Floyd's Algorithm, Warshall's
Algorithm,
UNIT V:
Objectives: Analysis of complexities in various sorting techniques along with their lower bounds
Sorting Methods: Order Statistics: Lower Bound on Complexity for Sorting Methods: Lower Bound on
Worst Case Complexity, Lower Bound on Average Case Complexity, Heap Sort, Quick Sort, Radix Sorting,
Merge Sort.
UNIT VI:
Objectives: Illustration of tries which share some properties of table look up, various issues related to
the design of file structures
Pattern matching and Tries: Pattern matching algorithms- the Boyer–Moore algorithm, the Knuth-
Morris-Pratt algorithm
Tries: Definitions and concepts of digital search tree, Binary trie, Patricia, Multi-way trie
File Structures: Fundamental File Processing Operations-opening files, closing files, Reading and Writing
file contents, Special characters in files.
Fundamental File Structure Concepts- Field and record organization, Managing fixed-length, fixed-field
buffers.
(Reference 5)

Text Books:
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz, Sahani, Anderson-freed, Universities Press

Reference Books:
1. Web: http://lcm.csa.iisc.ernet.in/dsa/dsa.html
Zoellick
COMPUTER ORGANIZATION

Objectives: Comprehensive knowledge of computer system including the analysis and design of components of the system

UNIT I:
Objectives: Gives a view of computer system from user’s perspective, representation of data
BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes.

UNIT II:
Objectives: Understanding RTL, Micro operations, ALU, Organization of stored program computer, types of instructions and design of basic components of the system
REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Register

UNIT III:
Objectives: Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU
MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, design of control unit

UNIT IV:
Objectives: Illustration of algorithms for basic arithmetic operations using binary and decimal representation

UNIT V:
Objectives: Description of different parameters of a memory system, organization and mapping of various types of memories
THE MEMORY SYSTEM: Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

UNIT VI:
Objectives: Describes the means of interaction devices with CPU, their characteristics, modes and introduction multiprocessors.
MULTI PROCESSORS: Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration.

TEXT BOOKS:

REFERENCES:
FORMAL LANGUAGES & AUTOMATA THEORY

Objectives: Understanding of programming language construct, how input is converted into output from the machine hardware level

UNIT I:
Objectives: Analysis of Finite state machine, its representation and automata

UNIT II:
Objectives: Delineation of various components of formal languages and grammars.
Formal Language Theory- Symbols, alphabets and strings, operations on strings, formal languages, operations on languages,
Formal Languages/ Grammar Hierarchy: Formal Languages, Regular Language, Context-Free Language, Context-Sensitive Language, Recursively Enumerable Language, Other Forms of Formal Languages, Relationship between Grammars and Languages

UNIT III:
Objectives: Description of finite automata, variants in it and their equivalence
Finite Automata: Introduction, Deterministic Finite Automata (DFA), Design of DFAs, Non Deterministic Finite Automata (NFA), Non-Deterministic Automata with \( \varepsilon \)-moves, Design of NFA- \( \varepsilon \) s, Advantages of Non-Deterministic Finite Automata, NFA Versus DFA
Equivalent Automata: Equivalent Finite-State Automata, Equivalence of NFA/NFA- \( \varepsilon \) and DFA, Equivalence of NFA, with \( \varepsilon \) moves to NFA, without \( \varepsilon \) - moves.

UNIT IV:
Objectives: Minimization, optimization of finite automata, regular expressions and equivalence of finite automata and regular expressions.
Minimization/ Optimization of DFA: Optimum DFA, Minimal DFA, Two way DFA, DFA Vs 2DFA
Regular Expressions and Languages: Regular languages, regular expressions, components of regular expressions, properties of regular expressions, uses of regular expressions.
Finite Automata and Regular Expressions: Properties of regular sets and regular languages, Arden’s theorem, equivalence of finite automata and regular expressions, equivalence of DFA and regular expression, equivalence of NFA and regular expression

UNIT V:
Objectives: Illustration about grammars, classification and simplification of grammars
Transducers: Moore Machine, Mealy Machine, Difference between Moore and Mealy Machines, Properties / Equivalence of Moore and Mealy Machines.

UNIT VI:
Objectives: Delineation of turing machines
Turing Machine: Introduction, Components of Turing Machine, Description of Turing Machine, Elements of TM, Moves of a TM, Language accepted by a TM, Role of TM’s, Design of TM’s
TM Extensions and Languages: TM Languages, Undecidable Problem, P and NP Classes of Languages

Text Books:
2. Introduction to Automata Theory, Formal languages and computation, Shamalendu kandar, Pearson
3. Elements of Theory of Computation, Harry R Lewis, Papdimitriou, PHI
4. Introduction to theory of computation, 2nd ed, Michel sipser, CENGAGE

Reference Books:
1. Formal Languages and automata theory, C.K. Nagpal, OXFORD
2. Theory of Computation, a problem solving approach, kavi Mahesh, Wiley
3. Automata, computability and complexity, Theory and applications, Elaine rich, PEARSON
4. Theory of Computation, Vivek kulkarni, OXFORD
ADVANCED DATA STRUCTURES LAB

1. To implement functions of Dictionary using Hashing (division method, multiplication method, Universal hashing)
2. To perform various operations i.e., insertions and deletions on AVL trees
3. To perform various operations i.e., insertions and deletions on 2-3 trees.
4. To implement operations on binary heap.
5. To implement operations on graphs
   i) vertex insertion
   ii) Vertex deletion
   iii) finding vertex
   iv) Edge addition and deletion
6. To implement Depth First Search for a graph non recursively.
7. To implement Breadth First Search for a graph non recursively.
8. To implement Prim’s algorithm to generate a min-cost spanning tree.
9. To implement Kruskal’s algorithm to generate a min-cost spanning tree.
10. To implement Dijkstra’s algorithm to find shortest path in the graph.
11. To implement pattern matching using Boyer-Moore algorithm.
12. To implement Knuth-Morris-Pratt algorithm for pattern matching.
1. Write a JAVA program to display default value of all primitive data types of JAVA.
2. Write a JAVA program that displays the roots of a quadratic equation ax²+bx+c=0. Calculate the discriminant D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to display the Fibonacci sequence.
4. Write a JAVA program to sort given list of numbers.
5. Write a JAVA program to search for an element in a given list of elements (linear search).
6. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
7. Write a JAVA program to determine the addition of two matrices.
8. Write a JAVA program to determine multiplication of two matrices.
9. Write a JAVA program to sort an array of strings.
10. Write a JAVA program to check whether given string is palindrome or not.
11. Write a JAVA program to give the example for call by value.
12. Write a JAVA program to give the example for call by reference.
13. Write a JAVA program to give the example for ‘this’ operator. And also use the ‘this’ keyword as return statement.
14. Write a JAVA program to demonstrate static variables, methods, and blocks.
15. Write a JAVA program to give the example for ‘super’ keyword.
16. Write a JAVA program that illustrates simple inheritance.
17. Write a JAVA program that illustrates multi-level inheritance.
18. Write a JAVA program demonstrating the difference between method overloading and method overriding.
19. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
20. Write a JAVA program that describes exception handling mechanism.
21. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
22. Write a JAVA program to illustrate sub class exception precedence over base class.
23. Write a JAVA program for creation of user defined exception.
24. Write a JAVA program to illustrate creation of threads using runnable class. (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
25. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.
26. Write a JAVA program illustrating multiple inheritance using interfaces.
27. Write a JAVA program to create a package named pl, and implement this package in ex1 class.
28. Write a JAVA program to create a package named mypack and import it in circle class.
29. Write a JAVA program to give a simple example for abstract class.
30. Write a JAVA program that describes the life cycle of an applet.
   - Write a JAVA program to create a dialogbox and menu.
   - Write a JAVA program to create a grid layout control.
31. Write a JAVA program to create a border layout control.
32. Write a JAVA program to create a padding layout control.
33. Write a JAVA program to create a simple calculator.
34. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
35. Write a JAVA program that displays number of characters, lines and words in a text file.
FREE OPEN SOURCE SOFTWARE (FOSS) LAB

Objectives:
- To teach students various unix utilities and shell scripting

Programs:

1. Session-1
   a) Log into the system
   b) Use vi editor to create a file called myfile.txt which contains some text.
   c) Correct typing errors during creation.
   d) Save the file
   e) Logout of the system

2. Session-2
   a) Log into the system
   b) Open the file created in session 1
   c) Add some text
   d) Change some text
   e) Delete some text
   f) Save the Changes
   g) Logout of the system

   2. a) Log into the system
   b) Use the cat command to create a file containing the following data. Call it mytable use tabs to separate the fields.

      1425      Ravi     15.65
      4320      Ramu     26.27
      6830      Sita     36.15
      1450      Raju     21.86

   c) Use the cat command to display the file, mytable.
   d) Use the vi command to correct any errors in the file, mytable.
   e) Use the sort command to sort the file mytable according to the first field. Call the sorted file mytable (same name)
   f) Print the file mytable
   g) Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it mytable (same name)
   h) Print the new file, mytable
   i) Logout of the system.

3. 1) a) Login to the system
    b) Use the appropriate command to determine your login shell
    c) Use the /etc/passwd file to verify the result of step b.
    d) Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.
    e) Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

2) a) Write a sed command that deletes the first character in each line in a
b) Write a sed command that deletes the character before the last character in each line in a file.
c) Write a sed command that swaps the first and second words in each line in a file.

4. a) Pipe your /etc/passwd file to awk, and print out the home directory of each user.
b) Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.
c) Repeat
d) Part using awk

5. a) Write a shell script that takes a command–line argument and reports on whether it is directory, a file, or something else.
b) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
c) Write a shell script that determines the period for which a specified user is working on the system.

6. a) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.
b) Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

7. a) Write a shell script that computes the gross salary of a employee according to the following rules:
   i) If basic salary is < 1500 then HRA = 10% of the basic and DA = 90% of the basic.
   ii) If basic salary is >= 1500 then HRA = Rs500 and DA = 98% of the basic
   The basic salary is entered interactively through the keyboard.
b) Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

8. a) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b) Write a shell script that takes a login name as command–line argument and reports when that person logs in
c) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

9. a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
b) Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.
c) Write a shell script to perform the following string operations:
   i) To extract a sub-string from a given string.
   ii) To find the length of a given string.

10. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:
    i) File type
    ii) Number of links
    iii) Read, write and execute permissions
    iv) Time of last access
   (Note: Use stat/fstat system calls)

11. Write C programs that simulate the following unix commands:
   a) mv
   b) cp
   (Use system calls)

12. Write a C program that simulates ls Command
    (Use system calls / directory API)
13. Do the following Shell programs also

1) Write a shell script to check whether a particular user has logged in or not. If he has logged in, also check whether he has eligibility to receive a message or not.

2) Write a shell script to accept the name of the file from standard input and perform the following tests on it:
   a) File executable  
   b) File readable  
   c) File writable  
   d) Both readable & writable

3) Write a shell script which will display the username and terminal name who login recently in to the unix system.

4) Write a shell script to find no. of files in a directory.

5) Write a shell script to check whether a given number is perfect or not.

6) Write a menu driven shell script to copy, edit, rename and delete a file.

7) Write a shell script for concatenation of two strings.

8) Write a shell script which will display Fibonacci series up to a given number of argument.

9) Write a shell script to accept student number, name, marks in 5 subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat.
   
   Rules: 
   - avg>=80 then grade A
   - Avg<80&&Avg>=70 then grade B
   - Avg<70&&Avg>=60 then grade C
   - Avg<60&&Avg>=50 then grade D
   - Avg<50&&Avg>=40 then grade E
   - Else grade F

10) Write a shell script to accept empno, empname, basic. Find DA, HRA, TA, PF using following rules. Display empno, empname, basic, DA, HRA, PF, TA, GROSS SAL and NETSAL. Also store all details in a file called emp.dat.
   
   Rules: 
   - HRA is 18% of basic if basic > 5000 otherwise 550
   - DA is 35% of basic
   - PF is 13% of basic
   - IT is 14% of basic
   - TA is 10% of basic

11) Write a shell script to demonstrate break and continue statements.

12) Write a shell script to satisfy the following menu options:
   a. Display current directory path  
   b. Display todays date  
   c. Display users who are connected to the unix system  
   d. Quit

13) Write a shell script to delete all files whose size is zero bytes from current directory.

14) Write a shell script to display string palindrome from given arguments.

15) Write a shell script which will display Armstrong numbers from given arguments.

16) Write a shell script to display reverse numbers from given argument list.

17) Write a shell script to display factorial value from given argument list.

18) Write a shell script which will find maximum file size in the given argument list.

19) Write a shell script which will greet you “Good Morning”, “Good Afternoon”, “Good Evening” and “Good Night” according to current time.

20) Write a shell script to sort the elements in a array using bubble sort technique.

21) Write a shell script to find largest element in a array.

22) Write an awk program to print sum, avg of students marks list.

23) Write an awk program to display students pass/fail report.

24) Write an awk program to count the no. of vowels in a given file.

25) Write an awk program which will find maximum word and its length in the given input file.

26) Write a shell script to generate the mathematical tables.

27) Write a shell script to sort elements of given array by using selection sort.

28) Write a shell script to search given number using binary search.

29) Write a shell script to find number of vowels, consonants, numbers, white spaces and special characters in a given string.

30) Write a shell script to lock the terminal.
Course Objectives: To make the student to understand the process involved in a compiler, create an overall view of various types of translators, linkers, loaders, and phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling.

Course Outcomes:
1. To introduce the major concept areas of language translation and compiler design
2. To develop an awareness of the function and complexity of compilers.
3. To provide practical, hands on experience in compiler design
4. Identify the similarities and differences among various parsing techniques and grammar transformation techniques

Unit–I:

Unit–II
Syntax Analysis – discussion on CFG, LMD,RMD, parse trees, Role of a parser – classification of parsing techniques – Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing.

Unit–III
What is bottom up parsing approach, Types of Bottom up approaches; Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables.
More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing. Comparison of all bottoms up approaches with all top down approaches

Unit–IV
Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking.

Unit–V
Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection. Reference counting garbage collectors.

Unit–VI
Machine independent code optimization – semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

TEXT BOOKS:

REFERENCE BOOKS:
4. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE
5. Implementations of Compiler, A new approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER
Data Communication

Course Objectives:
1. To have a detailed study of various analog and digital modulation and demodulation techniques
2. To have a thorough knowledge of various multiplexing schemes and Data communication protocols
3. To know about the standards and mechanisms of television systems

Course Outcomes:
1. Knowledge of working of basic communication systems
2. Ability to evaluate alternative models of communication system design

Syllabus:

Unit I:
INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.


Unit II:
METALLIC CABLE TRANSMISSION MEDIA: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves


Unit III:
DIGITAL TRANSMISSION: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to-Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Compingding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

MULTIPLEXING AND T CARRIERS: Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network

Unit IV:

Unit V:
TELEPHONE INSTRUMENTS AND SIGNALS: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.


Unit VI:
DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS:
Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization.

TEXT BOOKS:
1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

Reference Books:
1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition. TMH.
2. Data and Computer communications, 8/e, William Stallings, PHI.
Principles of Programming Languages

Course objectives:
1. To understand and describe syntax and semantics of programming languages
2. To understand data, data types, and basic statements
3. To understand call-return architecture and ways of implementing them
4. To understand object-orientation, concurrency, and event handling in programming languages
5. To develop programs in non-procedural programming paradigms

Course Outcomes:
Upon Completion of the course, the students will be able to
1. Describe syntax and semantics of programming languages
2. Explain data, data types, and basic statements of programming languages
3. Design and implement subprogram constructs, Apply object-oriented, concurrency, and event handling programming constructs
4. Develop programs in Scheme, ML, and Prolog
5. Understand and adopt new programming languages

Syllabus:

UNIT I:
SYNTAX AND SEMANTICS: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

UNIT II:
DATA, DATA TYPES, AND BASIC STATEMENTS: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, assignment statements, mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT III:
SUBPROGRAMS AND IMPLEMENTATIONS: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

UNIT IV:
OBJECT- ORIENTATION, CONCURRENCY, AND EVENT HANDLING: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT V :
FUNCTIONAL PROGRAMMING LANGUAGES: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML,

UNIT VI :
LOGIC PROGRAMMING LANGUAGES: Introduction to logic and logic programming, – Programming with Prolog, multi - paradigm languages

TEXT BOOKS:

REFERENCES:
Database Management Systems

Course Objectives:
Provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications. The logical design, physical design and implementation of relational databases are covered.

Course Outcomes:
- define a Database Management System
- give a description of the Database Management structure
- understand the applications of Databases
- know the advantages and disadvantages of the different models
- compare relational model with the Structured Query Language (SQL)
- know the constraints and controversies associated with relational database model.
- know the rules guiding transaction ACID
- understand the concept of data planning and Database design
- identify the various functions of Database Administrator

Syllabus:

Unit – I: INTRODUCTION
Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications.
Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Unit – II:
RELATIONAL MODEL:
Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance
BASIC SQL:
Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

Unit – III:
Entity Relationship Model:
Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.
SQL:
Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

Unit – IV:
SCHEMA REFINEMENT (NORMALIZATION):
Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Unit – V:
TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL:
Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.
SQL constructs that grant access or revoke access from user or user groups. Basic PL/SQL procedures, functions and triggers.
UNIT – VI:
STORAGE AND INDEXING : Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

Text Books :
1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA

Reference Books :
1. Database System Concepts. 5/e Silberschatz, Korth, TMH
2. Introduction to Database Systems, 8/e C J Date, PEA
Operating Systems

Course Objectives:
To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc

Course Outcomes:
By the end of the course student will be able to
- describe the general architecture of computers
- describe, contrast and compare differing structures for operating Systems
- understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

Syllabus:

UNIT-I:
Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-II:

UNIT-III:
Concurrency: Process synchronization, the critical- section problem, Peterson’s Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

UNIT-IV:
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation
Virtual Memory Management: virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

UNIT-V:
Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

UNIT-VI:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
File System implementation- File system structure, allocation methods, free-space management
Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling

TEXT BOOKS:

REFERENCE BOOKS:
3. Operating System A Design Approach-Crowley, TMH.
Course Objectives:
To enlighten the student with knowledge base in compiler design and its applications

Course Outcomes:
Demonstrate a working understanding of the process of lexical analysis, parsing and other compiler design aspects.

Lab Experiments:

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar.
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL(1) parser for an expression
6. Design predictive parser for the given language
8. Design a LALR bottom up parser for the given language.
9. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
10. Write a program to perform loop unrolling.
11. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
12. Write a program for constant propagation.
Operating System Lab

Objective:
- To provide an understanding of the design aspects of operating system

Recommended Systems/Software Requirements:
- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

Lab Experiments:
1. Simulate the following CPU scheduling algorithms
   a) Round Robin  b) SJF  c) FCFS  d) Priority
2. Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()
3. Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls
4. Simulate all File allocation strategies
   a) Sequenced  b) Indexed  c) Linked
5. Simulate MVT and MFT
6. Simulate all File Organization Techniques
   a) Single level directory  b) Two level  c) Hierarchical  d) DAG
7. Simulate Bankers Algorithm for Dead Lock Avoidance
9. Simulate all page replacement algorithms.
   a) FIFO  b) LRU  c) LFU etc….
10. Simulate Paging Technique of memory management.
Objectives:
· To teach the student database design and query and PL/SQL.

System/Software Requirements:
· Intel based desktop PC
· Mysql/Oracle latest version Recommended

PROGRAMS LIST:
1) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4) Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5) i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

TEXT BOOKS:
1) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
2) ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc-Graw Hill.
3) SQL & PL/SQL for Oracle 10g, Black Book, Dr. P. S. Deshpande.

4) Data Base Management System, Oracle SQL and PL/SQL, Pranab Kumar Das Gupta, P Radha Krishna, PHI
Linux Programming Lab

Objectives:
To give a practical orientation of programming in Linux environment using system calls and advanced concepts in unix programming

PROGRAMS LIST:

1. Write C programs that uses open, read, write system calls.
2. Write C programs that differentiates FILE *(file stream pointers in C standard library) and file descriptors by using functions such as fdopen, fileno.
3. Write a C program which displays a given files meta data by using stat system call and st_mode structure.
4. Write a C program which lists all the files of current working directory whose size is more than given number of data blocks.
5. Write a C program which lists all the files of current working directory which contains hard link files.
6. Write a C program to emulate file system checking utility (fsck command) using system calls.
7. Example C program which supports that child process inherits environment variables, command line arguments, opened’ files.
8. Simple C programs to have process trees and process chains.
9. Simple C program that demonstrates the failure of fork system call because of crossing system limits.
10. Simple C programs to demonstrate the use of pipe system call for inter process communication and also emulating piping in shell.
11. Simple C programs to demonstrate the use of popen standard library function call for inter process communication and also emulating piping in shell.
12. Simple C program to use named pipes for inter process communication.
13. Simple C programs to illustrate the use of exec family of functions.
14. Write a C program which emulates simple shell.
15. Write C program to create a thread using pthreads library and let it run its function.
16. Write a C program to illustrate concurrent execution of threads using pthreads library.
17. Write a C program to simulate pthread_create function failure by repeatedly calling the same.
18. Write a C program which creates a thread using pthread and passes arguments to the thread function.
19. Write C programs which uses sigset, sifillset, sigprocmask, related system calls and structures.
20. Write a C program to simulate memory segment violation run time error and implement a signal handler (both reliable and unreliable) which handles situation.
21. Write a C program to illustrate the use of sbrk system call.
22. Write a C program to illustrate inter process communication via message queues.
23. Write a C program to illustrate inter process communication via shared memory.
24. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and fork.
25. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and pthread_create.
26. Write a C program to simulate producer and consumer problem using muexes, shared memory, and threads.
27. Write socket Programs in C for Echo/Ping/Talk Commands.
28. Create a Socket (TCP) between two computers and enable file transfer between them.
29. Write a Program to implement Remote Command Execution.
30. Write a code simulating ARP/RARP.

INTELLECTUAL PROPERTY RIGHTS AND PATENTS – 1

Unit 1
Unit 2

Unit 3

Unit 4

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

Course Objectives:
At the end of the course, the students will be able to:
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Course Outcomes:
After completing this course the student must demonstrate the knowledge and ability to:
1. Independently understand basic computer network technology.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

Syllabus:

UNIT – I:
Introduction: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT – II:
Physical Layer and overview of PL Switching: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT – III:
Data link layer: Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one’s complement internet checksum, services provided to Network Layer, Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.
Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

UNIT – IV:
Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multi cast, distance vector routing.

UNIT – V:
IEEE Standards: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

UNIT – VI:
Application layer (WWW and HTTP): ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format
The wireless web : WAP—The Wireless Application Protocol
TEXT BOOKS:
1. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
4. Computer Networks, Mayank Dave, CENGAGE

REFERENCES:
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
Data Warehouse and Mining

Course Objectives:
Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply. They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

Course Outcomes:
- a) understand why there is a need for data warehouse in addition to traditional operational database systems;
- b) identify components in typical data warehouse architectures;
- c) design a data warehouse and understand the process required to construct one;
- d) understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
- e) understand the details of different algorithms made available by popular commercial data mining software;
- f) solve real data mining problems by using the right tools to find interesting patterns

Syllabus:

UNIT –I: 
Introduction : What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining. (Han & Kamber)

UNIT –II: 
Data Pre-processing : Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. (Han & Kamber)

UNIT –III: 
Data Warehouse and OLAP Technology: An Overview : What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. (Han & Kamber)

UNIT –IV: 
Classification  : Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. 
Model Over fitting: Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. (Tan & Vipin)

UNIT –V 
Association Analysis: Basic Concepts and Algorithms : Introduction, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

UNIT –VI 
Text Books:
1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

Reference Books:
2. Data Mining: Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
Design and Analysis of Algorithms

Course Objectives:

Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

Syllabus:

UNIT-I:
Introduction: Algorithm, Psuedo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis.

UNIT-II:
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort

UNIT-III:

UNIT-IV:
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-V:
Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-VI:
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

TEXT BOOKS:
2. Design and Analysis of Algorithms, S Sridhar, Oxford

REFERENCE BOOKS:
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
Software Engineering

Course Objectives:
The students will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Course Outcomes:
1. knowledge of basic SW engineering methods and practices, and their appropriate application;
2. general understanding of software process models such as the waterfall and evolutionary models.
3. understanding of the role of project management including planning, scheduling, risk management, etc.
4. understanding of software requirements and the SRS document.
5. understanding of different software architectural styles.
6. understanding of implementation issues such as modularity and coding standards.
7. understanding of approaches to verification and validation including static analysis, and reviews.
8. understanding of software testing approaches such as unit testing and integration testing.
9. understanding of software evolution and related issues such as version management.
10. understanding on quality control and how to ensure good quality software.
11. understanding of some ethical and professional issues that are important for software engineers.
12. development of significant teamwork and project based experience.

Syllabus:

UNIT I: 

UNIT II: 
Requirements Engineering: Software Requirements, Requirements engineering Process, Requirements elicitation, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object oriented Analysis, Prototyping Analysis, Requirements Specification, Requirements Validation, requirement Management.

UNIT III: 
Object-Oriented Design: Object oriented Analysis and Design Principles

UNIT IV: 
Implementation: Coding Principles, Coding Process, Code verification, Code documentation
Software Testing: Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Usability Testing, Regression testing, Debugging approaches

UNIT V: 
Software Project Management: Project Management Essentials, What is Project management, Software Configuration Management.

UNIT VI: 
Software Quality: Software Quality Factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model
TEXT BOOKS:
1. Software Engineering, concepts and practices, Ugrasen Suman, Cengage learning
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering, 7/e, Roger S.Pressman, TMH

REFERENCE BOOKS:
1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
2. Software Engineering principles and practice, W S Jawadkar, TMH
3. Software Engineering concepts, R Fairley, TMH
Web Technologies

Course Objectives:
This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

Course Outcomes:
1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
4. Build web applications using PHP.
5. Programming through PERL and Ruby
6. Write simple client-side scripts using AJAX

Syllabus:

UNIT-I:

UNIT-II:
Working with XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

UNIT-III:
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX: (SOAP, WSDL, UDDI)

UNIT-IV:
PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as mySql, Oracle, SQL Sever.

UNIT-V:
Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search

UNIT-VI:
Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

Text Books:
2. Web Technologies, Uttam K Roy, Oxford

Reference Books:
1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
Objectives:
· To teach students practical orientation of networking concepts
· To teach students various forms of IPC through Unix and socket Programming

PART – A

1. Implement the data link layer framing methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra’s algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.
5. Take an example subnet of hosts. Obtain broadcast tree for it.

PART – B

1. Implement the following forms of IPC.
   a) Pipes 
   b) FIFO
2. Implement file transfer using Message Queue form of IPC.
3. Write a programme to create an integer variable using shared memory concept and increment the variable simultaneously by two processes. Use semaphores to avoid race conditions.
4. Design TCP iterative Client and server application to reverse the given input sentence.
5. Design TCP iterative Client and server application to reverse the given input sentence.
6. Design TCP client and server application to transfer file.
7. Design TCP client and server application to transfer file.
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call “select.”
9. Design a TCP concurrent server to echo given set of sentences using poll functions.
10. Design UDP Client and server application to reverse the given input sentence.
11. Design UDP Client server to transfer a file.
12. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
13. Design a RPC application to add and subtract a given pair of integers.
Software Engineering Lab

Objective:

- The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools

Experiments:

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS
2. Using COCOMO model estimate effort.
3. Calculate effort using FP oriented estimation model.
4. Analyze the Risk related to the project and prepare RMMM plan.
5. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare FTR
9. Prepare Version control and change control for software configuration items.
1. Design the following static web pages required for an online book store web site.

1) **HOME PAGE:**
   The static home page must contain three **frames**.
   Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
   Left frame: At least four links for navigation, which will display the catalogue of respective links.
   For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.
   Right frame: The **pages to the links in the left frame must be loaded here**. Initially this page contains description of the web site.

2) **Login page**

3) **CATALOGUE PAGE:**
   The catalogue page should contain the details of all the books available in the web site in a table.
   The details should contain the following:
   2. Author Name.
   3. Publisher.
   5. Add to cart button.
4. REGISTRATION PAGE:
Create a "registration form" with the following fields:
1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. Design a web page using CSS (Cascading Style Sheets) which includes the following:
1) Use different font, styles:
   In the style definition you define how each selector should work (font, color etc.).
   Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Write Ruby program reads a number and calculates the factorial value of it and prints the same.

8. Write a Ruby program which counts number of lines in a text file using its regular expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window.
14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes a set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passwd' program

18. An example perl program to connect to a MySQL database table and executing simple commands.

19. Example PHP program for contactus page.

20. **User Authentication:**
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id’s and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
   If he is a valid user (i.e., user-name and password match) you should welcome him by name(user-name) else you should display “You are not an authenticated user”.
   Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database (Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them.
Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

23. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form.
Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

24. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page (week2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.

25. **HTTP** is a stateless protocol. Session is required to maintain the state.
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time (i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.
UNIT - I

UNIT - II

UNIT - III
Introduction to Transactional Law: Creating Wealth and Managing Risk – The Employment Relationship in the Internet and Tech Sector – Contact for the Internet and Tech Sector - Business Assets in Information Age – Symbol and Trademark – Trolls and Landmines and other Metaphors

UNIT - IV
Regulatory, Compliance and Liability Issues – State Privacy Law - Date Security – Privacy issues - Controlling Over use or Misuse of Intellectual Property Rights

BOOKS:
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
Cryptography and Network Security

Course objectives:
The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the “modus operandi” of adversaries; which could be used for increasing software dependability.

Course outcomes:
1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Syllabus:

UNIT I : Classical Encryption Techniques
Objectives: The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.


UNIT II: Block Ciphers & Symmetric Key Cryptography
Objectives: The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography
Objectives: Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat’s and Euler’s Theorems, The Chinese Remainder theorem, Discrete logarithms.

UNIT IV : Cryptographic Hash Functions & Digital Signatures
Objectives: Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature

UNIT V: User Authentication, Transport Layer Security & Email Security

Objectives: Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.

User Authentication: Remote user authentication principles, Kerberos
Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH)
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP Security & Intrusion Detection Systems

Objectives: Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press

REFERENCE BOOKS:
UML & Design Patterns

Course Objectives:
The focus of this course is on design rather than implementation.
1. Introducing the Unified Process and showing how UML can be used within the process.
2. Presenting a comparison of the major UML tools for industrial-strength development.
3. Introduction to design patterns, practical experience with a selection of central patterns.

Course Outcomes:
Students successfully completing this course will be able to:
1. identify the purpose and methods of use of common object-oriented design patterns
2. select and apply these patterns in their own designs for simple programs
3. represent the data dependencies of a simple program using UML
4. represent user and programmatic interactions using UML
5. create design documentation outlining the testable and complete design of a simple program
6. produce and present documents for the purpose of capturing software requirements and specification
7. produce plans to limit risks specific to software designed for use in a particular social context

Syllabus:

Unit I: Introduction: Introduction to OOAD; typical activities / workflows / disciplines in OOAD, Introduction to iterative development and the Unified Process, Introduction to UML; mapping disciplines to UML artifacts, Introduction to Design Patterns - goals of a good design, Introducing a case study & MVC architecture

Unit II: Inception: Artifacts in inception, Understanding requirements - the FURPS model, Understanding Use case model - introduction, use case types and formats, Writing use cases - goals and scope of a use case, elements / sections of a use case, Use case diagrams, Use cases in the UP context and UP artifacts, Identifying additional requirements, Writing requirements for the case study in the use case model

Unit III: Elaboration: System sequence diagrams for use case model, Domain model : identifying concepts, adding associations, adding attributes, Interaction Diagrams, Introduction to GRASP design Patterns ,Design Model: Use case realizations with GRASP patterns, Design Class diagrams in each MVC layer Mapping Design to Code, Design class diagrams for case study and skeleton code

Unit 4: More Design Patterns: Fabrication, Indirection, Singleton, Factory, Facade, Publish-Subscribe

Unit 5: More UML diagrams: State-Chart diagrams, Activity diagrams, Component Diagrams, Deployment diagrams, Object diagrams

Unit 6: Advanced concepts in OOAD: Use case relationships, Generalizations Domain Model refinements, Architecture, Packaging model elements

Textbooks:
1. 'Applying UML and patterns' by Craig Larman, Pearson
2. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning
3. 'UML distilled' by Martin Fowler, Addison Wesley, 2003

Reference:
1. O’reilly ’s ‘Head-First Design Patterns’ by Eric Freeman et al, Oreililly
2. UML 2 Toolkit, by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: WILEY-Dreamtech India Pvt. Ltd.
Mobile Computing

Course Objective:

1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2) To understand the typical mobile networking infrastructure through a popular GSM protocol
3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
4) To understand the database issues in mobile environments & data delivery models.
5) To understand the ad hoc networks and related concepts.
6) To understand the platforms and protocols used in mobile environment.

Course Outcomes:

1) Able to think and develop new mobile application.
2) Able to take any new technical issue related to this new paradigm and come up with a solution(s).
3) Able to develop new ad hoc network applications and/or algorithms/protocols.
4) Able to understand & develop any existing or new protocol related to mobile environment

Syllabus:

UNIT I
Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.
GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II
(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III
Mobile Network Layer : IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

UNIT V

UNIT VI
Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.

Text Books:

Reference Book:

IV Year – I SEMESTER

Elective - I
Software Testing Methodologies

Course Objectives:
1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
5. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
6. To understand software test automation problems and solutions.
7. To learn how to write software testing documents, and communicate with engineers in various forms.
8. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Course Outcomes:
By the end of the course, the student should:
1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.
4. Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
5. Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
6. Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems
7. Have an ability to use software testing methods and modern software testing tools for their testing projects.

Syllabus:

UNIT 1:

UNIT II:
Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation
Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

UNIT III:
Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing
Static Testing: inspections, Structured Walkthroughs, Technical reviews

UNIT IV:
Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing
Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques

UNIT V:
Efficient Test Suite Management: Test case design, Why does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite
Software Quality Management: Software Quality metrics, SQA models
Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira

UNIT VI:
Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.
Testing Object Oriented Software: basics, Object oriented testing
Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

Text Books:
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3. Software Testing, Yogesh Singh, CAMBRIDGE

Reference books:
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
3. Effective Methods for Software testing, William E Perry, 3ed, Wiley
Simulation Modeling

Course Objectives:
1. Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs. This course focuses what is needed to build simulation software environments, and not just building simulations using preexisting packages.
2. Introduce concepts of modeling layers of society's critical infrastructure networks.
3. Build tools to view and control simulations and their results.

Course Outcomes:
1. provide a strong foundation on concept of simulation, and modeling.
2. understand the techniques of random number generations.
3. understand the techniques of testing randomness.
4. design simulation models for various case studies like inventory, traffic flow networks, etc.
5. practice on simulation tools and impart knowledge on building simulation systems.

Syllabus:

UNIT-I:
System models: Concepts, continuous and discrete systems, System modeling, types of models, subsystems, system study.

UNIT-II:
System Simulation: Techniques, comparison of simulation and analytical methods, types of simulation, Distributed log models, cobweb models.

UNIT-III:
Continuous system Simulation: Numerical solution of differential equations, Analog Computers, Hybrid Computers, continuous system simulation languages CSMP, system dynamic growth models, logistic curves.

UNIT-IV:
Probability concepts in simulation: Monte Carlo techniques, stochastic variables, probability functions, Random Number generation algorithms.

UNIT-V:
Queuing Theory: Arrival pattern distributions, servicing times, queuing disciplines, measure of queues, mathematical solutions to queuing problems.
Discrete System Simulation: Events, generation of arrival patterns, simulation programming tasks, analysis of simulation output.

UNIT-VI:
GPSS & SIMSCRIPT: general description of GPSS and SIMSCRIPT, programming in GPSS & SIMSCRIPT, Data structures, Implementation of activities, events and queues, Event scanning, simulation algorithms in GPSS and SIMSCRIPT.

TEXT BOOKS

REFERENCES
Information Retrieval Systems

COURSE OBJECTIVES

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

COURSE OUTCOMES

After completing the course student will be able to:

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understand the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.
- Explain the concepts of indexing, vocabulary, normalization and dictionary in information retrieval.
- Evaluate information retrieval algorithms, and give an account of the difficulties of evaluation
- Use different information retrieval techniques in various application areas
- Apply IR principles to locate relevant information large collections of data
- Analyze performance of retrieval systems when dealing with unmanaged data sources
- Implement retrieval systems for web search tasks.
- Understand and apply the basic concepts of information retrieval;
- Appreciate the limitations of different information retrieval techniques;
- Write programs to implement search engines;
- Evaluate search engines;
- Develop skills in problem solving using systematic approaches;
- Solve complex problems in groups and develop group work.

SYLLLABUS:

Unit I:
Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

Unit II:
Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

Unit III:
Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.
Unit IV:
**New Indices for Text:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

Unit V:
**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

Unit VI:
**Thesaurus Construction:** Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

**TEXT BOOK :**
2. Modern Information Retrieval By Yates Pearson Education.

**REFERENCES :**
2. Information retrieval Algorithms and Heuristics, 2ed, Springer
Artificial Intelligence

Course Objectives:
1. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
2. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
3. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Course Outcomes:
After completing this course, students should be able to:
1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
2. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
3. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
4. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

Syllabus:

UNIT-I:
Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI

UNIT-II:
Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction
Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:
Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:
Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:
Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-VI:
Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory
Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:
1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:
1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
Multimedia Computing

Course objectives:
To provide the foundation knowledge of multimedia computing, e.g. media characteristics, compression standards, multimedia representation, data formats, multimedia technology development.

Course outcomes:
1. understand the characteristics of different media; understand the representations of different multimedia data; understand different data formats; be able to take into considerations in multimedia system designs;
2. understand the characteristics of human’s visual system; understand the characteristics of human’s audio system; be able to take into considerations in multimedia techniques design and implementation;
3. understand different compression principles; understand different compression techniques; understand different multimedia compression standards; be able to design and develop multimedia systems according to the requirements of multimedia applications.
4. program multimedia data and be able to design and implement media applications;

Syllabus:

UNIT–I:

UNIT–II:
Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT–III:
Multimedia data compression I: Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression,

UNIT–IV:
Multimedia data compression II: Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

UNIT–V:
Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT–VI:

TEXT BOOKS:

REFERENCE BOOKS:
1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
5. Multimedia Basics by Weixel Thomson
6. Multimedia Technology and Applications, David Hilman , Galgotia
Course Objectives:
This course covers the design of advanced modern computing systems. In particular, the design of modern microprocessors, characteristics of the memory hierarchy, and issues involved in multi-threading and multi-processing are discussed. The main objective of this course is to provide students with an understanding and appreciation of the fundamental issues and tradeoffs involved in the design and evaluation of modern computers.

Course Outcomes:

1. Understand the concepts and terminology of high performance computing.
2. Can write and analyze the behavior of high performance parallel programs for distributed memory architectures (using MPI).
3. Can write and analyze the behavior of high performance parallel programs for shared memory architectures (using Pthreads and OpenMP).
4. Can write simple programs for the GPU.
5. Can independently study, learn about, and present some aspect of high performance computing.

Syllabus:

UNIT I:
Introduction to Parallel hardware and software, need for high performance systems and Parallel Programming, SISD, SIMD, MISD, MIMD models, Performance issues.

UNIT II:
Processors, PThreads, Thread Creation, Passing arguments to Thread function, Simple matrix multiplication using Pthreads, critical sections, mutexes, semaphores, barriers and conditional variables, locks, thread safety, simple programming assignments.

UNIT III:
OpenMP Programming: introduction, reduction clause, parallel for-loop scheduling, atomic directive, critical sections and locks, private directive, Programming assignments, n body solvers using openMP.

UNIT IV:
Introduction to MPI programming: MPI primitives such as MPI_Send, MPI-Recv, MPI_Init, MPI-Finalize, etc., Application of MPI to Trepizoidal rule, Collective Communication primitives in MPI, MPI derived datatypes, Performance evaluation of MPI programs, Parallel sorting algorithms, Tree search solved using MPI, Programming Assignments.

UNIT V:
Introduction to GPU computing, Graphics pipelines, GPGPU, Data Parallelism and CUDA C Programming, CUDA Threads Organization, Simple Matrix multiplication using CUDA, CUDA memories.

UNIT VI:

Text Books:
1. An Introduction to Parallel Programming, Peter S Pacheco, Elsevier, 2011
Reference Books:
1. CUDA by example: An introduction to General Purpose GPU Programming, Jason, Sanders, Edward Kandrit, Pearson, 2011
2. CUDA Programming, Shame Cook, Elsevier
3. High Performance Heterogeneous Computing, Jack Dongarra, Alexey & Lastovetsky, Wiley
4. Parallel computing theory and practice, Michel J. Quinn, TMH
Elective - II
Digital Forensics

Course Objectives:
This course is intended to provide students with greater depth of study in a number of key topics in the area of computer security in society: cybercrime, computer and forensics, analysis

Course Outcomes:
1. Understand financial and accounting forensics, and explain their role in preventing various forms of fraud.
2. Distinguish various types of computer crime, and use computer forensic techniques to identify the digital fingerprints associated with criminal activities

Syllabus:

Unit-I:
Investor’s Office and Laboratory: Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation

Unit-II:
Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools

Unit-III:

Unit-IV:
Computer Forensics Analysis and Validation: Determining What Data to Collect and Anlyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

Unit-V:

Unit-VI:
E-mail Investigations Cell Phone and Mobile Device Forensics: Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools, Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devoices

TEXT BOOK:
Hadoop and Big Data

Course Objectives:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

Course Outcomes:

- Preparing for data summarization, query, and analysis.
- Applying data modelling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

Unit 1:
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

Reference:

Unit 2:

References:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O’reilly
Hadoop in Action by Chuck Lam, MANNING Publ.

Unit 3:
Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O’reilly

Unit 4:
Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O’reilly

Unit 5:
Pig: Hadoop Programming Made Easier
Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin
Reference:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

Unit 6:
Applying Structure to Hadoop Data with Hive:
Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

References:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

Text Books:
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

References:
1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook,Srinath Perera, Thilina Gunarathe

Software Links:
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html
Software Project Management

Course Objectives:
1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3. To understand successful software projects that support organization's strategic goals

Course Outcomes:
1. To match organizational needs to the most effective software development model
2. To understand the basic concepts and issues of software project management
3. To effectively Planning the software projects
4. To implement the project plans through managing people, communications and change
5. To select and employ mechanisms for tracking the software projects
6. To conduct activities necessary to successfully complete and close the Software projects
7. To develop the skills for tracking and controlling software deliverables
8. To create project plans that address real-world management challenges

Syllabus:

**Unit I: Introduction**
Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals
Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

**Unit II: Project Approach**
Lifecycle models, Choosing Technology, Protoyping
Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

**Unit III: Effort estimation & activity Planning**
Estimation techniques, Function Point analysis, SLOC, COCOMO, Usecase-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis

**Unit IV: Risk Management**
Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

**Unit V: Project Monitoring & Control, Resource Allocation**
Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

**Unit VI: Software Quality**
Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)
Text Books:
1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill

Reference Book:
1. Software Project Management, Joel Henry, Pearson Education.
Machine Learning

Course objectives:

The main objective of this course is for the students to achieve basic knowledge of artificial intelligence, a deepened technical understanding of machine learning research and theories, as well as practical experience of the use and design of machine learning and data mining algorithms for applications and experiments. The course has a strong focus towards applied IT. The student not only learns how to critically review and compare different algorithms and methods, but how to plan, design, and implement learning components and applications and how to conduct machine learning experiments.

Course outcomes:

- The student will be able evaluate and compare the performance or, other qualities, of algorithms for typical learning problems.
- The student will be able to design a supervised or unsupervised learning system.

Syllabus:

UNIT I: Introduction:

UNIT II: Linear Regression & Logistic Regression:
Predicting numeric values: regression - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinkling Coefficients, The bias / Variance tradeoff.
Logistic Regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

UNIT III: Artificial Neural Networks:
Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

UNIT IV: Evaluation Hypotheses:
Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V: Support vector machines & Dimensionality Reduction techniques:
Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.
Dimensionality Reduction techniques: Principal Component analysis, Example.

UNIT VI:
Instance-Based Learning: Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.
Genetic Algorithms: Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

TEXT BOOKS:
1. Machine Learning ,Tom M. Mitchell, MGH

REFERENCE BOOKS:
1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004
Advanced Databases

Course Objectives:
1. Be able to design high-quality relational databases and database applications.
2. Have developed skills in advanced visual & conceptual modeling and database design.
3. Be able to translate complex conceptual data models into logical and physical data base designs.
4. Have developed an appreciation of emerging database trends as they apply to semi-structured data, the internet, and object-oriented databases.

Course Outcomes:
1. Identify, describe, and categorize database objects.
2. Design and implement advanced queries using Structured Query Language.
3. Design, construct and maintain a database and various database objects using procedural language constructs, forms and reports to solve problems.
4. Administer a database by recommending and implementing procedures including database tuning, backup and recovery.
5. Propose, implement and maintain database security mechanisms.

Syllabus:

UNIT – I:
Algorithms for Query Processing and Optimization: Translating SQL queries into relational algebra-algorithms for external sorting-algorithms for select and join operations-algorithms for project and set operations-implementing aggregate operations and outer joins-combining operations using pipelining-using heuristics in query optimization.

UNIT – II:
Database systems architecture and the system Catalog: System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle. Practical database design and tuning: Physical Database Design in Relational Databases-an overview of Database Tuning in Relational systems.

UNIT – III:
Distributed DBMS Concepts and Design: Introduction-function and architecture of a Distributed DBMS-Distributed Relational Database Design-transparencies in a Distributed DBMS-Date’s Twelve Rules for Distributed DBMS. Distributed DBMS-Advanced Concepts: Distributed Transaction Management-Distributed Concurrency Control-Distributed Deadlock Management-Distributed Database Recovery-The X/Open Distributed Transaction processing model-Replication Servers.

UNIT – IV:

UNIT V:
Object-Oriented DBMSs-Standards and Systems: Object management group-Object Database Standard ODMG3.0, 1999-Object store.
Object relational DBMSs: Introduction to Object-relational Database systems- third generation Database manifesto-Postgres-an early ORDBMS-SQL3.

UNIT – VI:
Emerging database technologies and applications: Hadoop, Big Data characteristics, No SQL databases, BASE, Brewer's theorem, Relationship between CAP, ACID and No SQL databases, comparison with Relational databases, No SQL databases types, Comparative study of NoSQL products, Case studies using MongoDB and Cassandra

TEXT BOOK:
2. Principles of distributed databases S Ceri and Palgetti TMH
3. Getting started with No SQL Databases , Gaurav Vaish

REFERENCES BOOKS:
1. “Principles of Distributed Database Systems”, Oszu, 2/e, PHI.
UML & Design Patterns Lab

(Textbook no.2 i.e. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning will be the primary source for finding templates for developing different artifacts / diagrams)

Take three case studies:
- Customer Support System (in the Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning )
- Point-Of-Sale Terminal (in Larman textbook)
- Library Management System (in the reference book no. 2 i.e. UML toolkit)

Week 1:
- Familiarization with Rational Rose or Umbrello

For each case study:

Week 2, 3 & 4:
For each case study:
- Identify and analyze events
- Identify Use cases
- Develop event table
- Identify & analyze domain classes
- Represent use cases and a domain class diagram using Rational Rose
- Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:
For each case study:
- Develop Use case diagrams
- Develop elaborate Use case descriptions & scenarios
- Develop prototypes (without functionality)
- Develop system sequence diagrams

Week 7, 8, 9 & 10:
For each case study:
- Develop high-level sequence diagrams for each use case
- Identify MVC classes / objects for each use case
- Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- Develop detailed design class model (use GRASP patterns for responsibility assignment)
- Develop three-layer package diagrams for each case study

Week 11 & 12:
For each case study:
- Develop Use case Packages
- Develop component diagrams
- Identify relationships between use cases and represent them
- Refine domain class model by showing all the associations among classes

Week 13 onwards:
For each case study:
- Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams
Mobile Application Development Lab

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
   * cut
   * copy
   * past
   * delete
   * select all
   * unselect all

3. Create a J2ME menu which has the following options (Event Handling):
   - cut - can be on/off
   - copy - can be on/off
   - paste - can be on/off
   - delete - can be on/off
   - select all - put all 4 options on
   - unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
   * Area code should be one of the following: 040, 041, 050, 0400, 044
   * There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.

8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
   - Students Marks Enquiry
   - Town/City Movie Enquiry
   - Railway/Road/Air (For example PNR) Enquiry/Status
   - Sports (say, Cricket) Update
   - Town/City Weather Update
   - Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.
11. Write an Android application program that accepts a name from the user and displays the hello name to
the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:
   (i) LinearLayout
   (ii) RelativeLayout
   (iii) TableLayout
   (iv) GridView layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development.
Lab Assignments

Problem Statement 01
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Blank or three-digit number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix</td>
<td>Three-digit number, not beginning with 0 or 1</td>
</tr>
<tr>
<td>Suffix</td>
<td>Four-digit number</td>
</tr>
<tr>
<td>Password</td>
<td>Six-character alphanumeric</td>
</tr>
<tr>
<td>Commands</td>
<td>&quot;Check status&quot;, &quot;Deposit&quot;, &quot;Withdrawal&quot;</td>
</tr>
</tbody>
</table>

Design adhoc test cases to test the system

Problem Statement 02
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Blank or three-digit number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix</td>
<td>Three-digit number, not beginning with 0 or 1</td>
</tr>
<tr>
<td>Suffix</td>
<td>Four-digit number</td>
</tr>
<tr>
<td>Password</td>
<td>Six-character alphanumeric</td>
</tr>
<tr>
<td>Commands</td>
<td>&quot;Check status&quot;, &quot;Deposit&quot;, &quot;Withdrawal&quot;</td>
</tr>
</tbody>
</table>

Design the test cases to test the system using following Black Box testing technique:
BVA, Worst BVA, Robust BVA, Robust Worst BVA
Equivalence class testing (Input/Output domain)

Problem Statement 03
Consider an application that is required to validate a number according to the following simple rules:
1. A number can start with an optional sign.
2. The optional sign can be followed by any number of digits.
3. The digits can be optionally followed by a decimal point, represented by a period.
4. If there is a decimal point, then there should be two digits after the decimal.
5. Any number—whether or not it has a decimal point, should be terminated a blank.
6. A number can start with an optional sign.
7. The optional sign can be followed by any number of digits.
8. The digits can be optionally followed by a decimal point, represented by a period.
9. If there is a decimal point, then there should be two digits after the decimal.
10. Any number—whether or not it has a decimal point, should be terminated a blank. Generate test cases to test valid and invalid numbers.

(HINT) Use Decision table and cause-effect graph to generate test cases.
Problem Statement 04
Generate test cases using Black box testing technique to Calculate Standard Deduction on Taxable Income. The standard deduction is higher for tax payers who are 65 or older or blind. Use the method given below to calculate tax.

1. The first factor that determines the standard deduction is the filing status. The basic standard deduction for the various filing status are:

<table>
<thead>
<tr>
<th>Filing Status</th>
<th>Basic Standard Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>$4,750</td>
</tr>
<tr>
<td>Married, filing a joint return</td>
<td>$9,500</td>
</tr>
<tr>
<td>Married, filing a separate return</td>
<td>$7,000</td>
</tr>
</tbody>
</table>

2. If a married couple is filing separate returns and one spouse is not taking standard Deduction, the other spouse also is not eligible for standard deduction.

3. An additional $1,000 is allowed as standard deduction, if either the filer is 65 yrs or the spouse is 65 yrs or older (the latter case applicable when the filing status is “Married” and filing “joint”).

4. An additional $1,000 is allowed as standard deduction, if either the filer is blind or the spouse is blind (the latter case applicable when the filing status is “married” and filing “joint”).

(HINT):
From the above description, it is clear that the calculation of standard deduction depends on the following 3 factors:
1. Status of filing of the filer
2. Age of the filer
3. Whether the filer is blind or not
In addition, in certain cases, the following additional factors also come into play in calculating the standard deduction.
1. Whether spouse has claimed standard deduction
2. Whether spouse is blind
3. Whether the spouse is more than 65 years old

Problem Statement 05
Consider the following program segment:

```c
1. int max (int i, int j, int k)
2. {
3.     int max;
4.     if (i>j) then
5.         if (i>k) then max=i;
6.         else max=k;
7.     else if (j > k) max=j
8.     else max=k
9.     return (max);
10. }
```

a) Draw the control flow graph for this program segment
b) Determine the cyclomatic complexity for this program
c) Determine the independent paths

Problem Statement 06
Source code of simple insertion sort implementation using array in ascending order in c programming language

```c
#include<stdio.h>
int main()
{
    int i,j,s,temp,a[20];
```
Printf ("Enter total elements: "); Scanf ("%d",&s);
printf("Enter %d elements: ",s); for(i=0;i<s;i++) scanf("%d",&a[i]); for(i=1;i<s;i++){
temp=a[i]; j=i-1; while((temp<a[j])&&(j>=0)){ a[j+1]=a[j];
j=j-1;
} a[j+1]=temp;
}
printf("After sorting: ");
for(i=0;i<s;i++)
printf(" %d",a[i]);
return 0;
}

**HINT:** for loop is represented as while loop

a) Draw the program graph for given program segment  
b) Determine the DD path graph  
c) Determine the independent paths  
d) Generate the test cases for each independent path

---

**Problem Statement 07**
Consider a system having an FSM for a stack having the following states and transitions:

**States**
- Initial: Before creation
- Empty: Number of elements = 0
- Holding: Number of elements > 0, but less than the maximum capacity
- Full: Number elements = maximum
- Final: After destruction

**Transitions**
- Initial to Empty: Create
- Empty to Holding, Empty to Full, Holding to Holding, Holding to Full: Add
- Empty to Final, Full to Final, Holding to Final: Destroy
- Holding to Empty, Full to Holding, Full to Empty: Delete

Design test cases for this FSM using state table-based testing.

---

**Problem Statement 08**
Given the following fragment of code, how many tests are required for 100% decision coverage? Give the test cases.

```plaintext
if width > length
then biggest_dimension = width
if height > width
then biggest dimension = height
end_if
else if biggest dimension = length
then if height > length
then biggest_dimension = height
end_if
end_if
```

**Hint** 04 test cases

---

**Problem Statement 09**
Given the following code, how much minimum number of test cases is required for full statement and branch coverage?

```plaintext
read p read q
if p+q> 100
then print "Large" endif
if p > 50
then print "p Large" endif
```

**Hint** 1 test for statement coverage, 2 for branch coverage
Problem Statement 10
Consider a program to input two numbers and print them in ascending order given below. Find all du paths and identify those du-paths that are not feasible. Also find all dc paths and generate the test cases for all paths (dc paths and non dc paths).

```c
#include<stdio.h>
#include<conio.h>
1. void main ()
2. {
3 int a, b, t;
4. Clrscl ();
5. Printf (“Enter first number”);
6. scanf (“%d”,&a);
7. printf (“Enter second number”);
8. scanf (“%d”,&b);
9. if (a<b){
10. t=a;
11a=b;
12 b=t;
13}
14. printf (“%d %d”, a, b);
15 getch ();
}
```

Problem Statement 11
Consider the above program and generate possible program slices for all variables. Design at least one test case from every slice.

Problem Statement 12
Consider the code to arrange the nos. in ascending order. Generate the test cases for relational coverage, loop coverage and path testing. Check the adequacy of the test cases through mutation testing and also compute the mutation score for each.

```c
i = 0;
n=4; //N-Number of nodes present in the graph
While (i<n-1) do j = i + 1;
While (j<n) do
i=i+1;
end do
```
Hadoop & BigData Lab

Week 1,2:

1. Implement the following Data structures in Java
   a) Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i) Perform setting up and Installing Hadoop in its three operating modes:
   - Standalone,
   - Pseudo distributed,
   - Fully distributed

   (ii) Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:
   - Adding files and directories
   - Retrieving files
   - Deleting files

   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data.

   Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9,10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11,12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes
Elective - III

Human Computer Interaction

Course Objectives:
The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

Course Outcomes:
1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
3. Apply an interactive design process and universal design principles to designing HCI systems.
4. Describe and use HCI design principles, standards and guidelines.
5. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
6. Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

Syllabus:

UNIT I:
Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession
Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

UNIT II:
Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT III:
Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing
Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

UNIT IV:
Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

UNIT V:
User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

UNIT VI:
Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces
Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization
Text Books:
1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books:
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
Advanced Operating Systems

Course Objectives:
The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

Course Outcomes:
1. Outline the potential benefits of distributed systems
2. Summarize the major security issues associated with distributed systems along with the
3. range of techniques available for increasing system security

Syllabus:

UNIT–I:
Introduction to Distributed systems: Goals of distributed system, hardware and software concepts, design issues.
Communication in Distributed systems: Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

UNIT–II:
Synchronization in Distributed systems: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions,

UNIT–III:
Deadlocks: deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

UNIT–IV:
Processes: Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

UNIT–V:
Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems.
Distributed shared memory: What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

UNIT–VI:
Case study MACH: Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.

TEXT BOOKS:
1. Distributed Operating System - Andrew. S. Tanenbaum, PHI

REFERENCE BOOKS:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne
Mobile Adhoc & Sensor Networks

Course Objectives:

1) To make the student understand the concepts of MOBILE AD HOC NETWORKS (Manets) as well as Wireless Sensor Networks (WSN), their characteristics, novel applications, and technical challenges.
2) To understand the issues and solutions of various layers of Manets, namely MAC layer, Network Layer & Transport Layer in Manets and WSN.
3) To understand the platforms and protocols used in Manets and WSN.
4) To make the student take up further research as part of his higher studies

Course Outcomes:

1) Able to think and develop new applications in Manets and WSN.
2) Able to take any new technical issue related to these new thrust areas and come up with a solution(s).
3) Able to develop algorithms/protocols for Manets and WSN.

Syllabus:

UNIT I : 
Introduction to Ad Hoc Networks: Characteristics of MANETs, applications of MANETs, and challenges of MANETs.
Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms,

UNIT II: 
Data Transmission: Broadcast storm problem, Broadcasting, Multicasting and Geocasting

UNIT III: 
TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, and Solutions for TCP over Ad hoc

UNIT IV: 

UNIT V : 
Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, and Sensor Networks and mobile robots.

UNIT VI : 
Security: Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.

Textbook:

   (Morgan Kauffman)
Pattern Recognition

Course Objectives:
The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition.

Course Outcomes:
1. Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),
2. Analyse classification problems probabilistically and estimate classifier performance,
3. Understand and analyse methods for automatic training of classification systems,
4. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
5. Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models.

Syllabus:

UNIT-I:
Introduction: Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation
Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero-one loss function, classifiers, discriminant functions, and decision surfaces

UNIT-II:
Normal density: Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

UNIT-III:
Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

UNIT-IV:
Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

UNIT-V:
Pattern recognition using discrete hidden Markov models: Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

UNIT-VI:
Continuous hidden Markov models:
Continuous observation densities, multiple mixtures per state, speech recognition applications.

Text Books:

Reference Books:
4. Pattern Recognition, Sergios Theodoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed,
Digital Image Processing

Course Objectives:
To make the students to understand

1. The fundamentals of Computer Graphics and Image Processing
2. The concepts related edge detection, segmentation, morphology and image compression methods.

Course Outcomes:

1. understanding of digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
2. ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
3. Ability To understand (i.e., be able to describe, analyse and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation

SYLLABUS:

UNIT I:
Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems
DDA line algorithms: Bresenham's line and circle derivations and algorithms

UNIT II:
2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, Composite Transformations- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT III:
Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:
Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:
SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

UNIT VI:
Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:

2. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, ( Unit III, Unit IV, Unit V and Unit VI)

References:

2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier
Microprocessors and Multi core systems

Course objectives:
The objective of this course is to provide extensive knowledge of microprocessor based systems. The student will
• learn how the hardware and software components of a microprocessor-based system work together to
  implement system-level features;
• learn both hardware and software aspects of integrating digital devices (such as memory and I/O interfaces)
  into microprocessor-based systems;

Course Outcomes:
1. able to solve basic binary math operations using the microprocessor.
2. able to demonstrate programming proficiency using the various addressing modes and data transfer
  instructions of the target microprocessor.
3. able to program using the capabilities of the stack, the program counter, and the status register and show how
  these are used to execute a machine code program.
4. able to apply knowledge of the microprocessor’s internal registers and operations by use of a PC based
  microprocessor simulator.
5. able to write assemble assembly language programs, assemble into machine a cross assembler utility and
  download and run their program on the training boards.

Syllabus:

UNIT-I: overview of microcomputer structure and operation., execution of a three instruction program, microprocessor
  evolution and types, the 8086 micro processor family , 8086 internal architecture , introduction to programming the
  8086,
8086 family assembly language programming :Program development steps , constructing the machine codes for
  8086 instructions, writing programs for use with an assembler, assembly language program development tools.
  ( Text Book 1)

UNIT-II: Implementing standard program structures in 8086 assembly language
Simple sequence programs, jumps, flags and conditional jumps, if-then, if-then-else and multiple if-then-else
  programs, while-do programs, repeat-until programs, instruction timing and delay loops.
  ( Text Book 1)

UNIT-III: Strings, procedures and macros
The 8086 string instructions, writing and using procedures, writing and using assembler
  macros.
8086 instruction descriptions and assembler directives
Instruction descriptions, assembler directives , DB, DD, DQ, DT, DW, end-program, endp, ends, equ ,even-align on
  even memory address, extrn , global, public / extrn, group, include, label, length- not implemented IBM MASM, name
  – off set, ORG, proc, ptr, segment, short, type
  ( Text Book 1)

UNIT-IV: 8086: 8086 interrupts and interrupt applications
8086 interrupts and interrupt responses, hardware interrupt applications, Software Interrupts, priority of interrupts,
  software interrupt applications, programming.
8086 assembly language programmes - Bit & Logic operations, strings, procedures, Macros, Number Format,
  Conversions, ASCII operations, signed Numbers Arithmetic, Programming using High level language constructs.
  ( Text Book 1)

UNIT-V: CPU: architecture of Intel 80286 CPU, Intel 80386, and 32-bit CPU- 80486-Microprocessor( No instruction set).( Text
  Book 2)

UNIT-VI:
The Pentium Family and Core 2 Microprocessors:
Introduction to the Pentium Processor, Pentium II Microprocessor, Pentium III, Pentium IV and Core2 Processors. (Text Book 2)

TEXT BOOKS:

1. Microprocessors and Interfacing, Douglas V Hall, Revised 2nd ed, TMH
2. The Intel Microprocessors, Architecture, programming and interfacing, 8ed, Barry Bray, Pearson
3. The X86 Microprocessors, architecture, Programming and Interfacing(8086 to Pentium), Lyla B Das, PEA

REFERENCE BOOKS:
Elective - IV
Embedded and Real Time Systems

Course Objectives:
Develop an understanding of the technologies behind the embedded computing systems
1. technology capabilities and limitations of the hardware, software components
2. methods to evaluate design tradeoffs between different technology choices.
3. design methodologies

Course Outcomes:
Understand the basics of an embedded system
1. Program an embedded system
2. Design, implement and test an embedded system.
Identify the unique characteristics of real-time systems
1. Explain the general structure of a real-time system
2. Define the unique design problems and challenges of real-time systems

Syllabus:

Unit-I:
Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT-II:
8—bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT-III:
RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-IV:
Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher’s problem.

UNIT-V:
The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling. Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-VI:

TEXT BOOK:

REFERENCE BOOKS:
1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
Course Objectives:
1. To have a detailed study of neural networks, Fuzzy Logic and uses of Heuristics based on human experience.
2. To Familiarize with Soft computing concepts.
3. To introduce the concepts of genetic algorithm and its applications to soft computing using some applications

Course Outcomes:
1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

Syllabus:

UNIT I:
INTRODUCTION: what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural

UNIT II:
LEARNING PROCESS: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT III:
CLASSICAL & FUZZY SETS: Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions.

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

UNIT V:
CONCEPT LEARNING: Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm
DECISION TREE LEARNING: Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning

UNIT VI:
GENETIC ALGORITHMS: Motivation, Genetic Algorithms, an Illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

TEXT BOOKS:
3. Machine Learning, Tom M. Mitchell, MGH

References:
Social Networks and the Semantic Web

Course Objectives:
This course addresses the issues needed to realize the vision of the Semantic Web through the use of Intelligent Agents. The objectives are:
- to understand semantic web
- to understand the role of ontology and inference engines in semantic web

Course Outcomes:
Students will
1. demonstrate knowledge and be able to explain the three different “named” generations of the web.
2. demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
3. be able to understand and analyze key Web applications including search engines and social networking sites.
4. be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. be able to analyze and explain how technical changes affect the social aspects of Web-based computing.
6. be able to develop “linked data” applications using Semantic Web technologies.

Syllabus:

UNIT-I:

UNIT-II:
Social Network Analysis: What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis.
Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III:
Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV:
Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontologicel representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V:
Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT-VI:
Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text Book:
**Reference Books:**

2. Information Sharing on the Semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications
Cloud Computing

Course Objectives: The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including IaaS, PaaS, SaaS, and developing cloud based software applications on top of cloud platforms.

Course Outcomes:

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer’s for actively initiating and installing cloud-based applications.
4. Assessment of own organizations’ needs for capacity building and training in cloud computing-related IT areas

Syllabus:

UNIT I: Systems modeling, Clustering and virtualization:
Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security and Energy Efficiency

UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:
Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT III: Cloud Platform Architecture:

UNIT IV: Cloud Programming and Software Environments:

UNIT V: Cloud Resource Management and Scheduling:

UNIT VI:
**Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system, Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service (S3)

**TEXT BOOKS:**

**REFERNCE BOOK:**
Distributed Systems

Course Objectives:
1. provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles

Course Outcomes:
1. Develop a familiarity with distributed file systems.
2. Describe important characteristics of distributed systems and the salient architectural features of such systems.
3. Describe the features and applications of important standard protocols which are used in distributed systems.
4. Gaining practical experience of inter-process communication in a distributed environment

Syllabus:

UNIT-I:

UNIT-II:
Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III:
Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV:

UNIT-V:
Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

UNIT-VI:
Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

TEXT BOOKS:
IV Year – II SEMESTER

Management Science

**Unit I**
**Introduction to Management:** Concept – nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure

**Unit II**
**Operations Management:** Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis)

**Unit III**
**Functional Management:** Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**Unit IV**
**Project Management:** (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**Unit V**

**Unit VI**
**Contemporary Management Practice:** Basic concepts of MIS, MRP, Justin-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**Text Books**
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, ‘Management Science’ Cengage, Delhi, 2012.

**References**
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011

**Objective:** To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/Tables:** Normal Distribution Function Tables need to be permitted into the examination Halls

<table>
<thead>
<tr>
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ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS &
COMMUNICATION
ENGINEERING

For

B.Tech., FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2013-14)

JAWAHARLAL NEHRU TECHNOLOGICAL
UNIVERSITY KAKINADA
KAKINADA – 533003, ANDHRA PRADESH, INDIA.
**Academic Regulations (R13) for B. Tech. (Regular)**

Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 onwards

1. **Award of B. Tech. Degree**
   
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
   
   1. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
   
   2. The candidate shall register for 180 credits and secure all the 180 credits.

2. **Courses of study**

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

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<tr>
<th>S.No.</th>
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<td>01</td>
<td>Electronics and Communication Engineering</td>
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<td>02</td>
<td>Electrical and Electronics Engineering</td>
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<td>Electronics and Computer Engineering</td>
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<td>Metallurgical Engineering</td>
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<td>18</td>
<td>Agricultural Engineering</td>
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3. **Distribution and Weightage of Marks**

(i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

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

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain 3 questions and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation ( 20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.
(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. 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 conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**

1. A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

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

3. Shortage of Attendance below 65% in aggregate shall not be condoned.

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

5. Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
6. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) credits.

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

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

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

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

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement of **40% of the credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**

5.4 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

6. **Course pattern**

1. The entire course of study is for four academic years, all the years are on semester pattern.

2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

7. **Award of Class**

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 180 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70 but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

8. **Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

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

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.
12. **TRANSITORY REGULATIONS**
   
   1. Discontinued or detained candidates are eligible for readmission as and when next offered.
   
   2. In case of transferred students from other Universities, the credits shall be transferred to JNTUK as per the academic regulations and course structure of the JNTUK.

13. **General**
   
   1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
   
   2. The academic regulation should be read as a whole for the purpose of any interpretation.
   
   3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
   
   4. The University 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 University.
   
   5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.
Academic Regulations (R13) for B. Tech.  
(Lateral entry Scheme)

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

1. **Award of B. Tech. Degree**
   A student will be declared eligible for the award of B. Tech. Degree if he  
   fulfils the following academic regulations:
   
   1.1 A student shall be declared eligible for the award of the B. Tech  
       Degree, if he pursues a course of study in not less than three  
       academic years and not more than six academic years.
   
   1.2 The candidate shall register for 132 credits and secure all the 132  
       credits.

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

3. **Promotion Rule**
   A student shall be promoted from second year to third year if he  
   fulfills the minimum attendance requirement.
   
   A student shall be promoted from III year to IV year if he fulfils the  
   academic requirements of 40% of the credits up to III year I semester  
   from all the examinations, whether or not the candidate takes the  
   examinations and secures prescribed minimum attendance in III year  
   II semester.

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
</tr>
</thead>
<tbody>
<tr>
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<td>First Class</td>
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</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
</tr>
</tbody>
</table>

   From the aggregate marks secured from 132 Credits from II year to IV year.

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

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

**Disciplinary Action for / Improper Conduct in Examinations**

<table>
<thead>
<tr>
<th>Nature of Malpractices / Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1. (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the</td>
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<tr>
<td>4.</td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>5.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td></td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>6.</td>
<td>Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
</tbody>
</table>
|   | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that
<table>
<thead>
<tr>
<th>No.</th>
<th>Offense</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td>Semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</td>
</tr>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>---</td>
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</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>
<td>Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
</tr>
<tr>
<td>12.</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.</td>
<td></td>
</tr>
</tbody>
</table>

**Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *
Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

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

<table>
<thead>
<tr>
<th>Ragging</th>
<th>Imprisonment upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing &amp; Humiliation</td>
<td>6 Months</td>
<td>Rs. 1,000/-</td>
</tr>
<tr>
<td>Assaulting or Using Criminal force or Criminal intimidation</td>
<td>1 Year</td>
<td>Rs. 2,000/-</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>2 Years</td>
<td>Rs. 5,000/-</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence</td>
<td>5 Years</td>
<td>Rs. 10,000/-</td>
</tr>
<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</td>
<td>Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
Ragging

ABSOLUTELY NOT TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded.
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
# COURSE STRUCTURE

## I Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – I</td>
<td>3</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics - I</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics – II (Mathematical Methods)</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Physics</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Professional Ethics and Human Values</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Engineering Drawing</td>
<td>1+3</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>English - Communication Skills Lab -1</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Engineering Physics Laboratory</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Engineering Physics – Virtual Labs - Assignments</td>
<td>--</td>
<td>2</td>
<td>--</td>
</tr>
<tr>
<td>10</td>
<td>Engineering Workshop&amp; IT Workshop</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td></td>
<td><strong>24</strong></td>
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</tbody>
</table>

## I Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – II</td>
<td>3</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics – III</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Chemistry</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Mechanics</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Computer Programming</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Network Analysis</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Engineering Chemistry Laboratory</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>English - Communication Skills Lab -2</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Computer Programming Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>
### II Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Managerial Economics and Financial Analysis</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Electronic Devices and Circuits</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Data Structures</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Environmental Studies</td>
<td>3</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Signals &amp; Systems</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Electrical Technology</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Electronic Devices and Circuits Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Networks &amp; Electrical Technology Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits**  
22

### II Year – II SEMESTER

<table>
<thead>
<tr>
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<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electronic Circuit Analysis</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Management Science</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Random Variables &amp; Stochastic Processes</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Switching Theory &amp; Logic Design</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>EM Waves and Transmission Lines</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Analog Communications</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Electronic Circuit Analysis Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Analog Communications Lab</td>
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**Total Credits**  
22
### III Year – I SEMESTER

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**Total Credits** 23

### III Year – II SEMESTER

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**Total Credits** 22
### IV Year – I SEMESTER

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<td>Digital Image Processing</td>
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<td>2. Analog IC Design</td>
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<td>3. Object Oriented Programming &amp; O S</td>
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<td>4. Radar Systems</td>
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<td>5. Advanced Computer Architecture</td>
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<td>2. Digital IC Design</td>
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<td>3. Speech Processing</td>
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<td></td>
<td>4. Artificial Neural Network &amp; Fuzzy Logic</td>
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<td>5. Network Security &amp; Cryptography</td>
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<td>2. System on Chip</td>
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<td>3. Low Power IC Design</td>
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<td>4. Bio-Medical Instrumentation</td>
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Total course credits = \[ 48 + 44 + 45 + 43 = 180 \]

Open Electives:

1. Bio Medical Engineering
2. Fuzzy & Neural Networks
3. Image Processing (not for ECE Students)
4. Principles of Signals, Systems and Communications (Not for ECE Students)
5. Electronic Instrumentation (Not for ECE Students)
SYLLABUS

I Year – I SEMESTER

ENGLISH –I
(Common to All Branches)

T P C
3+1 0 3

DETAILED TEXT-I English Essentials: Recommended Topics:

1. IN LONDON: M.K.GANDHI
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME:** The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM
   **OBJECTIVE:** To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE
   **OBJECTIVE:** This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:
   **OBJECTIVE:** To inform the learners how to write clearly and logically.
   **OUTCOME:** The learner will be able to think clearly and logically and write clearly and logically.

5. MAN’S PERIL
   **OBJECTIVE:** To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS
   **OBJECTIVE:** This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   **OUTCOME:** This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.
7. **LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man’s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME:** The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book** : ‘English Essentials’ by Ravindra Publications

**NON-DETAILED TEXT:**

*(From Modern Trailblazers of Orient Blackswan)*

*(Common single Text book for two semesters)*

*(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)*

1. **G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu’s example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. **G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. **Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. **Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax} V(x)$, $xV(x)$.
Applications: LCR circuit, Simple Harmonic motion

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac’s delta function- Inverse Laplace transforms– Convolution theorem (without proof).

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Partial differentiation:
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series for two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.
Subject Category
ABET Learning Objectives  a c e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

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

Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

UNIT VI Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients-
Method of separation of Variables
Applications : One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 6
JNTUK External Evaluation  B  E

Books:
4. DEAN G. DUFFY, Advanced engineering mathematics with MATLAB, CRC Press
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<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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<td>Theory Design</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
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<tr>
<td>Analysis</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<tr>
<td>Algorithms</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Drawing</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<td>Others</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td></td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<td>h) Understand impact of engineering</td>
<td>8. Lab work or field work based</td>
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<td>9. Presentation based</td>
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<td>10. Case Studies based</td>
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<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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<td>solutions in global, economic, environmenta, &amp; societal context</td>
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<td>i)</td>
<td>Recognize need for &amp; be able to engage in lifelong learning</td>
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<td>j)</td>
<td>Know contemporary issues</td>
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<td>k)</td>
<td>Use techniques, skills, modern tools for engineering practices</td>
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I Year – I SEMESTER

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:
Subject Category
ABET Learning Objectives  a e k
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT II Interpolation:
Introduction- Errors in Polynomial Interpolation – Finite differences-Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton’s formulae for interpolation – Interpolation with unevenly spaced points - Lagrange’s Interpolation formula
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT III Numerical solution of Ordinary Differential equations:
Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta Methods
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series application: Amplitude, spectrum of a periodic function
Subject Category
ABET Learning Objectives  a e d
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT V Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

Subject Category
ABET Learning Objectives  a d e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT VI Z-transform:
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

Subject Category
ABET Learning Objectives  a b e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

BOOKS:
2. DEAN G. DUFFY, Advanced Engineering Mathematics with MATLAB, CRC Press
3. V.RAVINDRANATH and P. VIJAYALAXMI, Mathematical Methods, Himalaya Publishing House
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<td>Communicate effectively</td>
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<td>Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
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UNIT-I

PHYSICAL OPTICS FOR INSTRUMENTS

“Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics”


UNIT-II

COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.


X-RAY DIFFRACTION TECHNIQUES : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg’s law.
UNIT-III
MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

Objective: Many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve


SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London’s equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV
ACOUSTICS AND EM – FIELDS:

Objective: The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

ACOUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

ELECTRO-MAGNETIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations (Calculus approach).

UNIT – V
QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence
on temperature – Fermi energy – density of states – derivations for current density.

**BAND THEORY OF SOLIDS:** Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**

**SEMICONDUCTOR PHYSICS:**

Objective: In the wake of ever increasing demand for the space and power the watch word “small is beautiful”, understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.


**TEXT BOOKS**

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.)

**REFERENCE BOOKS**

1. ‘Introduction to solid state physics’ by Charles Kittle (Willey India Pvt. Ltd).
2. ‘Applied Physics’ by T. Bhimasenkaram (BSP BH Publications )
3. ‘Applied Physics’ by M.Arumugam (Anuradha Agencies)
4. ‘Engineering Physics’ by Palanisamy (Scitech Publishers )
5. ‘Engineering Physics’ by D.K.Bhattacharya (Oxford University press).
6. ‘Engineering Physics’ by Mani Naidu S (Pearson Publications)
7. ‘Engineering Physics’ by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
UNIT I : Human Values:

UNIT II : Engineering Ethics:

UNIT III : Engineering as Social Experimentation:

UNIT IV : Engineers’ Responsibility for Safety and Risk:

UNIT V : Engineers’ Responsibilities and Rights:
UNIT VI : Global Issues:

**********

Text Books:

4. “Professional Ethics and Human Values” by Prof. D.R. Kiran.
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication.
Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.
Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes. Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications

REFERENCE BOOKS:
I Year – I Semester  T  P  C
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English – Communication Skills Lab – I

Suggested Lab Manuals:

Objective: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

Basic Communication Skills

Unit 1
A. Greeting and Introductions
B. Pure Vowels

Unit 2
A. Asking for information and Requests
B. Diphthongs

Unit 3
A. Invitations
B. Consonants

Unit 4
A. Commands and Instructions
B. Accent and Rhythm

Unit 5
A. Suggestions and Opinions
B. Intonation

Text Book:

‘Strengthen your Communication Skills’ Part-A by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
I Year – I SEMESTER

ENGINEERING PHYSICS LAB

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-
   Normal incidence
3. Determination of thickness of a thin object using parallel
   interference fringes.
4. Determination of Rigidity modulus of a material- Torsional
   Pendulum.
5. Determination of Acceleration due to Gravity and Radius of
   Gyration- Compound Pendulum.
7. Verification of laws of stretched string – Sonometer.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristicsof Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and
   Gee’s apparatus.
15. Hall Effect for semiconductor.

REFERENCE:

1. Engineering Physics Lab Manual by Dr. Y. Aparna &
   Dr. K.Venkateswarao (V.G.S.Book links).
I Year – I SEMESTER

Engineering Physics
Virtual Labs - Assignments

List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL: WWW.vlab.co.in
ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP:

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

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

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

IT WORKSHOP:

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

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.
Internet & World Wide Web:
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.

Productivity tools Crafting professional word documents; excel spreadsheets, power point presentations and personal web sites using the Microsoft suite of office tools.

(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware

Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

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

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

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

Task 5:
Hardware Troubleshooting (Demonstration):
Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

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

Internet & Networking Infrastructure


Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are
acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9 : MS Word Orientation:**
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10: Creating project :** Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

**Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.
**Task 14:** Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

**TEXT BOOK:**

Faculty to consolidate the workshop manuals using the following references

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

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.
2. PC Hardware trouble shooting made easy, TMH.
I Year – II SEMESTER

ENGLISH –II
(Common to All Branches)

DETAILED TEXT-II: Sure Outcomes: English for Engineers and Technologists Recommended Topics:

1. TECHNOLOGY WITH A HUMAN FACE
   OBJECTIVE: To make the learner understand how modern life has been shaped by technology.
   OUTCOME: The proposed technology is people’s technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
   OBJECTIVE: To make the learner understand how the unequal heating of earth’s surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   OUTCOME: The learner’s understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
   OBJECTIVE: To introduce the technologies of the 20th century and 21st centuries to the learners.
   OUTCOME: The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
   OBJECTIVE: To inform the learner of the various advantages and characteristics of water.
   OUTCOME: The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
   OBJECTIVE: In this lesson, Swami Vivekananda highlights the importance of work for any development.
   OUTCOME: The students will learn to work hard with devotion and dedication.

6. WORK BRINGS SOLACE
   OBJECTIVE: In this lesson Abdul Kalam highlights the advantage of work.
   OUTCOME: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons) / Semester II (5 to 8 lessons)

5. J.C. Bose
OBJECTIVE: To apprise of J.C. Bose’s original contributions.
OUTCOME: The learner will be inspired by Bose’s achievements so that he may start his own original work.

6. Homi Jehangir Bhaba
OBJECTIVE: To show Bhabha as the originator of nuclear experiments in India.
OUTCOME: The learner will be inspired by Bhabha’s achievements so as to make his own experiments.

7. Vikram Sarabhai
OBJECTIVE: To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
OUTCOME: The learner will realize that development is impossible without scientific research.

OBJECTIVE: To expose the reader to the pleasure of the humorous story
OUTCOME: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

UNIT I Linear systems of equations:
Application: Finding the current in an electrical circuit.
Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6 4
JNTUK External Evaluation A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Application: Free vibration of a two-mass system.
Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves).
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
Application: Moments of inertia
Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E
UNIT IV Special functions:
Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of improper integrals.
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient - Divergence - Curl - Laplacian and second order operators - Vector identities.
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Vector Integration:
application: work done, Force
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

BOOKS:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
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<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<td>Algorithms</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<tr>
<td>Drawing</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td>Others</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<td>h) Understand impact of engineering solutions in global,</td>
<td>8. Lab work or field work based</td>
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<td>9. Presentation based</td>
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<td>10. Case Studies based</td>
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<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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<td>economic, environmental, &amp; societal context</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
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<td>j) Know contemporary issues</td>
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<tr>
<td>k) Use techniques, skills, modern tools for engineering practices</td>
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I Year – II SEMESTER

ENGINEERING CHEMISTRY

UNIT-I: WATER TECHNOLOGY
Hard Water – Estimation of hardness by EDTA method – Potable water-
Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming
and foaming, scale formation, corrosion, caustic embrittlement, turbine
deposits – Softening of water – Lime soda, Zeolite processes – Reverse
osmosis – Electro Dialysis, Ion exchange process.

Objectives: For prospective engineers knowledge about water used in
industries (boilers etc.) and for drinking purposes is useful; hence chemistry
of hard water, boiler troubles and modern methods of softening hard water is
introduced.

UNIT-II : ELECTROCHEMISTRY
Concept of Ionic conductance – Ionic Mobilities – Applications of
Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode
potentials – Nernst equation – Electrochemical series – Potentiometric
titrations – Concentration cells – Ion selective electrode – Glass electrodes –
Fluoride electrode; Batteries and Fuel cells.

Objectives: Knowledge of galvanic cells, electrode potentials, concentration
cells is necessary for engineers to understand corrosion problem and its
control; also this knowledge helps in understanding modern bio-sensors, fuel
cells and improve them.

UNIT-III : CORROSION
Causes and effects of corrosion – theories of corrosion (dry, chemical and
electrochemical corrosion) – Factors affecting corrosion – Corrosion control
methods – Cathodic protection – Sacrificial Anodic, Impressed current
methods – Surface coatings – Methods of application on metals (Hot dipping,
Galvanizing, tinning, Cladding, Electroplating, Electroless plating) – Organic
surface coatings – Paints – Their constituents and their functions.

Objectives: the problems associated with corrosion are well known and the
engineers must be aware of these problems and also how to counter them

UNIT-IV : HIGH POLYMERS
Types of Polymerization – Stereo regular Polymers – Physical and
Mechanical properties of polymers – Plastics – Thermoplastics and thermo
setting plastics – Compounding and Fabrication of plastics – Preparation and

Objectives: Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V: FUELS

Objectives: A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI: CHEMISTRY OF ADVANCED MATERIALS

Objectives: With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

TEXT BOOKS
REFERENCES
Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

UNIT – III
Objectives: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures.
Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment
of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion

TEXT BOOKS:

REFERENCES:
OBJECTIVES: Formulating algorithmic solutions to problems and implementing algorithms in C.

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts.
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing (vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.

BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
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 for fibonacci series, towers of Hanoi, header
files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: 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 multi-dimensional arrays, dynamic memory management functions, command line arguments.

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan

Reference Books and web links:
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge
I Year – II SEMESTER

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NETWORK ANALYSIS

UNIT – I


Network Topology: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

UNIT – II

UNIT – III
Coupled Circuits: Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)
UNIT – IV

**Network Theorems:** Thevinin’s, Norton’s, Milliman’s, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegen’s-problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

UNIT – V

**Two-port networks:** Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)

UNIT – VI

**Transients:** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

**TEXT BOOKS:**

2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

**REFERENCES:**

2. Basic Circuit Analysis by DR Cunningham, Jaico Publishers.
I Year – II SEMESTER

ENGINEERING CHEMISTRY LABORATORY

List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na₂CO₃ solutions
3. Estimation of KMnO₄ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K₂Cr₂O₇ solution.
5. Estimation of Copper using standard K₂Cr₂O₇ solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKS

I Year – II SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6      Body language
UNIT 7      Dialogues
UNIT 8      Interviews and Telephonic Interviews
UNIT 9      Group Discussions
UNIT 10     Presentation Skills
UNIT 11     Debates

Text Book:

‘Strengthen your Communication Skills’ Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
Exercise 1
a) Write a C Program to calculate the area of triangle using the formula
   \[ \text{area} = \left( s \left( s-a \right) \left( s-b \right) \left( s-c \right) \right)^{1/2} \]
   where \( s = (a+b+c)/2 \)
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2
a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3
a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4
a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.
Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a liner search.
c) Write a C program to implement binary search.

Exercise 6
a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 7
Write a C program that uses functions to perform the following operations:
  i. To insert a sub-string in to given main string from a given position.
  ii. To delete n Characters from a given position in a given string.
  iii. To replace a character of string either from beginning or ending or at a specified location.

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:
  i) Reading a complex number
  ii) Writing a complex number
  iii) Addition of two complex numbers
  iv) Multiplication of two complex numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions
  - to concatenate two strings
  - to append a string to another string
  - to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions
  - to find the length of a string
  - to find whether a given string is palindrome or not

Exercise 11
a) Write a C functions to find both the largest and smallest number of an array of integers.
b) Write C programs illustrating call by value and call by reference concepts.
Exercise 12
Write C programs that use both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To find Fibonacci sequence

Exercise 13
a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers

Exercise 14
a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.
b) Write a C program to swap two numbers using pointers.

Exercise 15
Examples which explores the use of structures, union and other user defined variables.

Exercise 16
a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.
II Year – I SEMESTER

T P C
3+1 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I:
(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand).

Unit – II:
(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III:
(*The Learning Objective of this Unit is to understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods).

Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson’s models – Methods of Pricing: Limit Pricing,
Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions).

Unit – IV:

(*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)

Types of Business Organization and Business Cycles:

(**One should equipped with the knowledge of different Business Units)

Unit – V:

(*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)

Introduction to Accounting & Financing Analysis:

(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis).

Unit – VI:

(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods).


(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making).

Note : *Learning Objective

** Learning Assessment

TEXT BOOKS :

REFERENCES:
1. V. Maheswari : Managerial Economics, Sultan Chand.
UNIT-I
Semi Conductor Physics: Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

UNIT- II
Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

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

UNIT- IV
Transistor Characteristics:
BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.
**FET:** FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

**UNIT- V**

Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in $V_{BE}$, $I_c$, and $\beta$, Stability factors, ($S$, $S'$, $S''$), Bias compensation, Thermal runaway, Thermal stability. FET Biasing- methods and stabilization.

**UNIT- VI**

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of $h$-parameters, conversion of $h$-parameters, generalized analysis of transistor amplifier model using $h$-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

**TEXT BOOKS:**


**REFERENCES:**

DATA STRUCTURES

Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications.

UNIT I:
Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques
Preliminaries of algorithm, Algorithm analysis and complexity
Data structure- Definition, types of data structures
Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion.
List Searches using Linear Search, Binary Search, Fibonacci Search
Sorting Techniques: Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort ) and merging (merge sort ) Algorithms.

UNIT II:
Objectives: Applying stack and queue techniques for logical operations
Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

UNIT III:
Objectives: Exposure to list representation models in various types of applications
Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list
UNIT IV:
Objectives: Implementation of tree implementation in various forms
Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree, Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

UNIT-V:
Objectives: Advanced understanding of other variants of trees and their operations.
Advanced concepts of Trees: Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations).

UNIT VI:
Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees.
Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms.
Graph Traversals (BFS & DFS), applications: Dijkstra’s shortest path, Transitive closure, Minimum Spanning Tree using Prim’s Algorithm, warshall’s Algorithm (Algorithmic Concepts Only, No Programs required).

TEXT BOOKS:
1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss

REFERENCE BOOKS:
2. Classic Data Structures, 2/e, Debasis ,Samanta PHI,2009
II Year – I SEMESTER

ENVIRONMENTAL STUDIES

Course Learning Objectives:
The objectives of the course is to impart
1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on
1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

Syllabus:

UNIT - I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains,
ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.

**Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

**Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear
hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**


**UNIT - VI**

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**

**Reference:**

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II Year – I SEMESTER

SIGNALS AND SYSTEMS

UNIT I
SIGNAL ANALYSIS & FOURIER SERIES: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function. Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet’s conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

UNIT II

UNIT III
SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT IV
CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross
correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT V
LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s, Relation between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT VI

TEXT BOOKS:

REFERENCES:
2. Signals and Systems – K R Rajeswari
4. Signals and Systems
This course covers various topics related to principle of operation and performance of various electrical machines.

**Learning objectives:**

i. To learn the principle of electromechanical energy conversion of single excited and multi excited machines.

ii. To understand the principle of operation, constructional details and operational characteristics of DC generators.

iii. To understand the principle and characteristics of DC motors. To introduce starting and speed control methods of DC motors.

iv. To learn the principle of operation and constructional details of transformers. Develop the equivalent circuit and evaluate the performance of transformers.

v. To learn the principle of operation and constructional details of three phase induction motor. Study the torque – slip characteristics and starting methods of induction motor.

vi. To study the principle of operation of single phase induction motor, shaded pole motor, capacitor motor and AC servo motor.

**UNIT I**

**ELECTROMECANICAL ENERGY CONVERSION :** Introduction to S.I units – Principles of electromechanical energy conversion – forces and torque in a magnetic field systems-energy balance – single excited machine – magnetic forces– co-energy – multi excited magnetic field system.

**UNIT II**

**DC GENERATORS :** Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators.

**UNIT III**

**DC MOTORS :** Principle of operation and construction of DC Motors – types of DC Motors – Characteristics of DC motors – basic starting methods
for DC shunt motor – losses and efficiency – Swinburne’s test – speed control of DC shunt motor – flux and Armature voltage control methods.

UNIT IV

UNIT V

UNIT VI

Learning outcomes:
1. Able to understand the principles of electro mechanical energy conversion.
2. Able to explain the operation of DC generator and analyze the characteristics of DC generator.
3. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
5. Ability to analyze speed – torque characteristics of induction motor and understand starting methods of induction motor.
6. Capability to understand the operation of various special machines.

TEXT BOOKS:
REFERENCE BOOKS:

ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: Electronic Workshop Practice

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

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

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

PART C: Equipment required for Laboratory
1. Boxes
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes
7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade Résistance Boxes/Rheostats
10. Decade Capacitance
PART – A
Any five experiments are to be conducted from each part

2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin’s and Norton’s equivalent circuits and verification by direct test.

PART – B

2. Swinburne’s Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method.
UNIT-I
Small Signal High Frequency Transistor Amplifier models:
BJT: Transistor at high frequencies, Hybrid- $\pi$ common emitter transistor model, Hybrid $\pi$ conductances, Hybrid $\pi$ capacitances, validity of hybrid $\pi$ model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.
FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II
Multistage Amplifiers: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT-III
Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

UNIT-IV
Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and
Colpitt’s oscillators with BJT and FET and their analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT-V

**Power Amplifiers:** Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Advanced power amplifiers, Distortion in amplifiers.

UNIT-VI

**Tuned Amplifiers** : Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

TEXT BOOKS:


REFERENCES:

II Year – II SEMESTER

T P C 3+1 0 3

MANAGEMENT SCIENCE

UNIT – I:
(*The Learning objective of this Unit is to understand the concept and nature of Management, Evolution of Management theories, Motivation and leadership Styles).

(**The learner is able to understand the concept and functions of Management, and Theories of Motivation, Styles of Leadership)

UNIT – II:
(The Learning objective of this Unit is to Equip with the concepts of Operations, project management and inventory control).

(**The learner is able to understand the main idea of Inspection and scrutinize the different methods of inspection, the concept of Inventory Management and Control and Inventory Pricing).

UNIT – III:
(* The Objective of this unit is to understand the main functional areas of organization i.e., Financial Management, Production Management, Marketing Management, Human Resource Management, and Product Life Cycles and Channels of Distribution).

(**At the end of this chapter the learner is able to understand the different functional areas in an organization and their responsibilities – Product Life Cycle and Channels of Distribution.).

UNIT – IV:
(*The objective of this unit is to equip with the concept and practical issues relating to Strategic Management)

The learner is able to familiar with the meaning of Vision, Mission, Goals and Strategies of the Organization and to implement successfully).

UNIT – V:
(*The objective of this unit is to understand the need and importance of Business Ethics and Communication Skills in Contemporary situations).

**Business Ethics & Communications:** Ethics in Business and Management – Ethics in HRM, Finance & Marketing Management – Business Ethics & Law
(* The Learner is able to know the practical Issues of Business Ethics in various functional areas, to improve Report Writing skills and Understand the Communication Process).

UNIT – VI:
(*The Learning objective of this unit is to equip with the contemporary management practices, i.e., MIS, MRP, JIT and ERP etc.,)

(* The Learner is able to Understand the various contemporary issues in Management Practices like TQM and BPO etc.,)

Note: *Learning Objective

Learning Assessment

TEXT BOOKS

REFERENCES
UNIT I

UNIT II

UNIT III

UNIT IV
UNIT V

UNIT VI

TEXT BOOKS:

REFERENCES:
UNIT – I

REVIEW OF NUMBER SYSTEMS & CODES:

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1’s compliments and r’s compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT – II

MINIMIZATION TECHNIQUES:

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

UNIT – III

COMBINATIONAL LOGIC CIRCUITS DESIGN:

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

INTRODUCTION OF PLD’s:

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V

SEQUENTIAL CIRCUITS I:

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

UNIT – VI

SEQUENTIAL CIRCUITS II:

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

TEXT BOOKS:

2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

REFERENCE BOOKS:

1. Modern Digital Electronics by RP Jain, TMH.
II Year – II SEMESTER

EM WAVES AND TRANSMISSION LINES

UNIT I


UNIT II


UNIT III


UNIT IV

EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection,

UNIT VI

UNIT VI
Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; \( \lambda /4 \), \( \lambda /2 \), \( \lambda /8 \) Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching. Illustrative Problems.

TEXT BOOKS :

REFERENCES :
ANALOG COMMUNICATIONS

UNIT I
AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

UNIT III

UNIT IV
NOISE: Noise in Analog communication System, Noise in DSB & SSB
System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

UNIT V

UNIT VI
PULSE MODULATION: Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM.

TEXT BOOKS:

REFERENCES:
II Year – II SEMESTER

ELECTRONIC CIRCUIT ANALYSIS LAB

Note: The students are required to design the electronic circuit and they have to perform the simulation using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory.

PART A: List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Determination of $f_T$ of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt’s Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

PART B: Equipment required for Laboratory

Software:

i. Multisim/ Pspice/Equivalent Licensed simulation software tool

ii. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)

Active & Passive Electronic Components
II Year – II SEMESTER

ANALOG COMMUNICATIONS LAB

List of Experiments (Twelve experiments to be done) - (a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box)

A. Amplitude Modulation - Mod. & Demod.
B. AM - DSB SC - Mod. & Demod.
C. Spectrum Analysis of Modulated signal using Spectrum Analyser
D. Diode Detector
E. Pre-emphasis & De-emphasis
F. Frequency Modulation - Mod. & Demod.
G. AGC Circuits
H. Sampling Theorem
I. Pulse Amplitude Modulation - Mod. & Demod.
J. PWM, PPM - Mod. & Demod.
K. PLL

Equipments & Software required:

Software:

i.) Computer Systems with latest specifications
ii) Connected in Lan (Optional)
iii) Operating system (Windows XP)
iv) Simulations software (Simulink & MATLAB)

Equipment:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multimeters
6. Spectrum Analyser
OBJECTIVES
The student will be made

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

UNIT I
LINEAR WAVE SHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II
NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clamps.

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

Digital Logic gate circuits: Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families.

UNIT IV
MULTIVIBRATORS:
Bistable Multi Vibrator: Analysis and Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector catching Diodes, Commutating Capacitors,
Methods of Triggering using RC network & Diode, Emitter Coupled Bistable Multi Vibrator (Schmitt trigger).

**Monostable Multi Vibrator:** Analysis and Design of Collector Coupled Monostable Multi Vibrator, Triggering method of a Monostable Multi Vibrator, Application of Monostable Multi Vibrator as a Voltage to Time Converter.

**Astable Multi Vibrator:** Analysis and Design of Collector Coupled Astable Multi vibrator, Application of Astable Multi Vibrator as a Voltage to Frequency Converter. All circuits are transistor version.

**UNIT V**

**VOLTAGE TIME BASE GENERATORS :** General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

**UNIT VI**

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

**TEXT BOOKS :**

**REFERENCES :**

**OUTCOMES**
After going through this course the student will be able to
- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.
III Year – I SEMESTER  

LINEAR IC APPLICATIONS

OBJECTIVES
The student will
- Study characteristics, realize circuits, design for signal analysis using Op-amp ICs.
- Study the linear and non-linear applications of operational amplifiers.
- Study IC 555 timer, PLL and VCO with their applications.
- Study and understand different types of ADCs and DACs
- Acquire skills required for designing and testing integrated circuits

UNIT I

UNIT II

UNIT III

UNIT IV
Four Quadrant multiplier, balanced modulator, IC1496, Applications of analog switches and Multiplexers, Sample & Hold amplifiers.

UNIT V

UNIT VI
DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

TEXT BOOKS:

REFERENCES:
2. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.

OUTCOMES
After going through this course the student will be able to
- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Acquire skills required for designing and testing integrated circuits.
- Understand the gain-bandwidth concept and frequency response of the three basic amplifiers. Understand thoroughly the operational amplifiers with linear integrated circuits.
- Design combinational logic circuits for different applications.
CONTROL SYSTEMS

OBJECTIVES
The student will

- Learn the fundamental concepts of Control systems and mathematical modelling of the system.
- Study the concepts of time response and frequency response of the system.
- Understand the basics of stability analysis of the system.

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

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

UNIT III
TIME RESPONSE ANALYSIS

UNIT IV
STABILITY ANALYSIS IN S-DOMAIN
The concept of stability – Routh’s stability criterion – qualitative stability and
conditional stability – limitations of Routh’s stability.

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

STABILITY ANALYSIS IN FREQUENCY DOMAIN:
Polar Plots, Nyquist Plots Stability Analysis.

UNIT VI
CLASSICAL CONTROL DESIGN TECHNIQUES

TEXT BOOKS:

REFERENCE BOOKS:

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

- Represent the mathematical model of a system.
- Determine the response of different order systems for various step inputs.
- Analyse the stability of the system.
OBJECTIVES
The student will be introduced to

• The electrical behavior of CMOS both in static and dynamic conditions and before that study the diode/transistor-transistor logic and Emitter coupled logic.
• In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
• Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.
• Understand the concepts of SSI Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL.

Unit-I:
Digital Design Using HDL: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

Unit-II:

Unit-III:
Programmable Logic Devices (PLDs) & Memories: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs with relevant Digital ICs.

Unit-IV:
Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS
logic families. Bipolar logic, Transistor-Transistor logic, TTL families, CMOS/TTL interfacing, Low voltage CMOS logic and interfacing, Emitter coupled logic.

Unit-V: **Combinational Logic Design**: Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, Encoders, three state devices, multiplexers and demultiplexers, Code Converters, Parity circuits, Comparators, Multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, Modeling of Circuits by using VHDL.

Unit-VI: **Sequential Logic Design**: SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, Modeling of Circuits by using VHDL.

**TEXTBOOKS:**

**REFERENCES:**

**OUTCOMES:**
After going through this course the student will be able to
- Understand the concepts of different logics and implementations using Integrated circuits.
- Design and analyze any Digital design in real time applications.
- Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language.
- Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers.

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OBJECTIVES
The student will be able to

- understand the applications of the electromagnetic waves in free space.
- introduce the working principles of various types of antennas
- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- understand the concepts of radio wave propagation in the atmosphere.

UNIT I
ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II
THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and Rr relations for small loops.

UNIT III
ANTENNA ARRAYS: 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity

UNIT IV

UNIT V
Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI
TEXT BOOKS

REFERENCES

OUTCOMES
After going through this course the student will be able to
- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna’s performance
- Identify the characteristics of radio wave propagation
III Year – I SEMESTER

Pulse & Digital Circuits Lab

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
12. UJT Relaxation Oscillator.

EQUIPMENT REQUIRED FOR LABORATORY:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters
III Year – I SEMESTER

LIC APPLICATIONS LAB

Minimum Twelve Experiments to be conducted:

1. Study of ICs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPs.
8. IC 555 Timer – Monostable Operation Circuit.
9. IC 555 Timer – Astable Operation Circuit.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.
15. 4 bit DAC using OP AMP.

EQUIPMENT REQUIRED FOR LABORATORIES:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:– IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

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III Year – I SEMESTER  T  P  C
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Digital System Design & DICA Laboratory

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware.

List of Experiments:
1. Realization of Logic Gates
2. 3 to 8 Decoder- 74138
3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Decade Counter- 7490
7. 4 Bit Counter-7493
8. Shift Register-7495
9. Universal shift register-74194/195
10. Ram (16*4)-74189 (read and write operations)
11. ALU

Equipment Required:
1. Xilinx ISE software-latest version
2. Personal computer with necessary peripherals
3. Hardware kits- Various FPGA families.
III Year – I SEMESTER

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I

Unit II

Unit III

Unit IV

Unit V

Unit VI

REFERENCE BOOKS:

3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
III Year – II SEMESTER

MICRO PROCESSORS AND MICRO CONTROLLERS

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

UNIT-I: 8086/8088 MICROPROCESSORS
Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings, the processor 8088, machine language instruction formats, addressing mode of 8086, instruction set off 8086, assembler directives and operators.

UNIT-II: PROGRAMMING WITH 8086 MICROPROCESSOR
Machine level programs, programming with an assembler, Assembly language programs, introduction to stack, stack structure of 8086/8088, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

UNIT-III: BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88
Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255, interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255. Programmable interrupt controller 8259A, the keyboard/display controller 8279, programmable communication interface 8251 USART, DMA Controller 8257.

UNIT-IV: ADVANCED MICRO PROCESSORS
Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386,
real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386. The coprocessor 80387.

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

UNIT-VI: PIC MICROCONTROLLERS AND ARM 32-BIT MICROCONTROLLER
Overview and features, PIC16Cx/7X instructions, interrupts in PIC 16C61/71, PIC 16F8XX Flash controllers, I/O ports and timers. Introduction to 16/32 Bit processors, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

TEXT BOOKS:

REFERENCES:

OUTCOMES
After going through this course the student will be able to
- develop programs for different addressing modes.
- perform 8086 interfacing with different peripherals and implement programs.
- describe the key features of serial and parallel communication and able to
- Design a microcontroller for simple applications.
OBJECTIVES
The student will be able to
- Define and use Discrete Fourier Transforms (DFTs)
- Use Z - transforms and discrete time Fourier transforms to analyze a digital system.
- Understand simple finite impulse response filters
- Learn the design procedures used for filter bank
- Learn to program a DSP processor to filter signals

UNIT I
INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II

UNIT III
REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations - digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT IV

UNIT V
MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.
UNIT VI
INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs: Multiplier and Multiplier 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 Register, Index 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:

OUTCOMES
After going through this course the student will be able to
• Estimate the spectra of signals that are to be processed by a discrete time filter, and to verify the performance of a variety of modern and classical spectrum estimation techniques.
• Design and simulate a digital filter
• Design new digital signal processing systems.
• Design and realize FIR, IIR filters
• Program a DSP processor to filter signals
OBJECTIVES
The student will be able to

- understand pulse digital modulation systems such as PCM, DPCM and DM.
- understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error.
- study the concept of entropy and need for source coding.
- study Block codes, cyclic codes and convolution codes.

UNIT I
PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its drawbacks, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II
DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III
DATA TRANSMISSION: Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK, QPSK.

UNIT IV
INFORMATION THEORY: Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.
UNIT V
SOURCE CODING: Introductions, Advantages, Shannon’s theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT VI
LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.


TEXT BOOKS:
1. Digital communications - Simon Haykin, John Wiley, 2005

REFERENCES:

OUTCOMES
After going through this course the student will be able to
- analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
- analyze various source coding techniques
- Compute and analyze Block codes, cyclic codes and convolution codes.
- Design a coded communication system.
OBJECTIVES
The student will

• Understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.

• Understand the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.

• Understand the multiport junction concept for splitting the microwave energy in a desired direction.

• Understand the function, design, and integration of the major microwave components like oscillator, modulator, power amplifier, filter, and mixer in building a Microwave test bench setup for measurements.

UNIT I

UNIT II

Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems.

UNIT III
WAVEGUIDE COMPONENTS AND APPLICATIONS - I :Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities –

UNIT - IV
MICROWAVE TUBES: Limitations and Losses of conventional tubes at microwave frequencies.

UNIT V
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.
M-type Tubes
Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave.
Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT VI
TEXT BOOKS:

REFERENCES:
4. Microwave Engineering – G S N Raju, I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson

OUTCOMES: After going through this course the student will
- Gain knowledge of transmissionlines and waveguide structures and how they are used as elements in impedance matching and filter circuits.
- Apply analysis methods to determine circuit properties of passive or active microwave devices.
- Gain knowledge and understanding of microwave analysis methods.
- Distinguish between M-type and O-type tubes
- Analyze and measure various microwave parameters using a Microwave test bench
Open Elective

Open Electives:

1. Bio Medical Engineering
2. Fuzzy & Neural Networks
3. Image Processing (not for ECE Students)
4. Principles of Signals, Systems and Communications (Not for ECE Students)
5. Electronic Instrumentation (Not for ECE Students)

Note: ECE Students can also Choose the OPEN ELECTIVES Offered by any Other Department.

**BIO-MEDICAL ENGINEERING**

(OPEN ELECTIVE)

**UNIT-I:**

**UNIT-II:**
UNIT-III:


UNIT-IV:
PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.


UNIT-V:

UNIT-VI:
MONITORS, RECORDERS AND SHOCK HAZARDS: Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention,
Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books:

References:
Unit: 1

Introduction to Image Processing:

Digital Imaging System:
Types of File Formats – GIF, JPEG, PNG, DICOM, SVG Structure of TIFF File Format.

Unit: 2


Unit: 3

Image Enhancement: Image Quality and Need for Image Enhancement, Image Quality Metrics, Image Enhancement Point Operations Linear and
Non-linear Functions, Piecewise Linear Functions, Histogram-based Techniques, Spatial Filtering Concepts, Image Smoothing Spatial Filters and its design, Image Sharpening Spatial Filters Frequency Domain Filtering

**Image Restoration:** Image Degradation (Restoration) Model, Categories of Image Degradations, Noise Modeling, Blur and Distortions, Image Restoration in the Presence of Noise Only, Mean Filters, Order-statistics Filters, Image Restoration Techniques, Constrained and Unconstrained Methods, Geometrical Transforms for Image Restoration.

**Unit: 4**

**Image Compression:**

Lossless Compression Algorithms, Run-length Coding, Huffman Coding, Shannon–Fano Coding, Bit-plane Coding, Arithmetic Coding, Lossless Predictive Coding, Lossy Compression Algorithms, Block Transform Coding, Image and Video Compression standards, JPEG, Video Compression – MPEG.

**Unit: 5**

**Image Segmentation:**

**Unit: 6**

**Colour Image Processing:**
YUV Model, YIQ Model, Y C_b C_r Colour Model, Printing Colour Models-
CMK and CMYK Models.

Colour Quantization – Popularity Algorithm, Median-cut Algorithm, Octree-
based Algorithm, Pseudo Colour Image Processing.

Full Colour Processing – Colour Transformation – Image Filters for Colour
Images – Noise in Colour Images, Colour Image Segmentation–
Thresholding, K-means Clustering Technique, RGB Colour Space
Segmentation, Colour Features.

**Text Books:**

**Reference Books:**
Principles of Signals, Systems and Communications
(OPEN ELECTIVE)

Unit – I

Signal Analysis: Introduction, Fourier Series - Trigonometric Fourier Series, Complex Exponential Fourier Series; Complex Fourier Spectrum – Time Domain and Frequency Domain Representation of a Signal; Fourier Transform - Analysis of a Non Periodic Function over entire interval; Fourier Transform Involving Impulse Function; Properties of Fourier Transform and Significance- Convolution Integral, Fourier Transform of Periodic Functions.

Unit – II

Linear Systems: Introduction; System Function – Representation of a function f(t) and its response r(t), Definition of System Function; Distortionless Transmission – Band width of a system, Rise Time and System Band Width; Energy Signals and Power Signals, Energy and Power Spectral Densities; Correlation – Cross and Auto Correlation and their properties.

Unit – III


Unit – IV


Unit – V

Pulse Modulations: Sampling Theorem – Nyquist Interval, Aliasing, Signal recovery from its sampled version; Flat Top and Natural Sampling, PAM-PAM Modulation and Demodulation, PWM and PPM, Time Division
Multiplexing, Frequency Division Multiplexing and Comparison between TDM and FDM.

Unit – VI


**Digital Modulation:** ASK, FSK, PSK and DPSK, QPSK demodulation, Coherent and Non-coherent Reception, Comparison of Binary and Quaternary Modulation Schemes, M-ary modulation techniques.

**TEXT BOOKS:**


**REFERENCE BOOKS:**

III Year – II SEMESTER  

MICROPROCESSORS AND MICROCONTROLLERS LAB

The students are required to develop the necessary Algorithm, Flowchart and Assembly Language Program Source Code for executing the following functions using MASM/TASM software and to verify the results with necessary Hardware Kits.

PART-I: MICROPROCESSOR 8086
1. Introduction to MASM/TASM.
2. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and unsigned Arithmetic operation, ASCII- Arithmetic operation.
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.

PART-II: INTERFACING WITH MICROPROCESSOR
1. 8259 – Interrupt Controller-Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display- Write a program to display a string of characters.
3. 8255 – PPI-Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART-Write a program in ALP to establish Communication between two processors.

PART-III: MICROCONTROLLER 8051
1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
PART-IV: INTERFACING WITH MICROCONTROLLER
Write C programs to interface 8051 chip to Interfacing modules to Develop single chip solutions.

1. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.
2. Alphanumeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and Temperature control interface to 8051.
4. Generate different waveforms Sine, Square, Triangular, and Ramp etc. using DAC interface to 8051; change the frequency and Amplitude.

EQUIPMENT REQUIRED FOR LABORATORY

1. MASM/TASM software
2. 8086 Microprocessor Kits
1. 8051 Micro Controller kits
2. Interfaces/peripheral subsystems
   i) 8259 PIC
   ii) 8279-KB/Display
   iii) 8255 PPI
   iv) 8251 USART
3. A/D and D/AC Interface
III Year – II SEMESTER

DIGITAL COMMUNICATIONS LAB

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

Equipment required for Laboratories:
1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.
LIST OF EXPERIMENTS:

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser window
5. To Implement IIR filter (LP/HP) on DSP Processors
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.
OBJECTIVES
The student will be introduced to

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

Unit-I:
Introduction: Introduction to IC Technology, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

Basic Electrical Properties Of MOS and Bi-CMOS Circuits: \( I_{ds} \) versus \( V_{ds} \) Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. The Pass transistor, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter. Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

Unit-II:
MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design
rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm
Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and
NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask
Form.

Unit-III:

**Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied
to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit
of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Wiring
Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor
switches, Realization of gates using NMOS, PMOS and CMOS technologies.

**Scaling Of MOS Circuits:** Scaling models, Scaling factors for device
parameters, Limits due to sub threshold currents, current density limits on
logic levels and supply voltage due to noise.

Unit-IV:

**Subsystem Design:** Architectural issues, switch logic, Gate logic, examples
of structured design, clocked sequential circuits, system considerations,
general considerations of subsystem design processes, an illustration of
design processes.

Unit-V:

**VLSI Design Issues:** VLSI Design issues and design trends, design process,
design for testability, technology options, power calculations, package
selection, clock mechanisms, mixed signal design, ASIC design flow, FPGA
design flow, introduction to SoC design.

Unit-VI:

**FPGA Design:** Basic FPGA architecture, , FPGA configuration,
configuration modes, FPGA design process- FPGA design flow, FPGA
families, FPGA design examples-stack, queue and shift register
implementation using VHDL, step-by-step approach of FPGA design process
on Xilinx environment.

**Text Books:**

1. Essentials of VLSI Circuits and Systems By Kamran Eshraghian,
   Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of

2. VLSI Design-Black Book By Dr. K.V.K.K. Prasad, Kattula
References:


OUTCOMES

After going through this course the student will be able to

- Apply the Concept of design rules during the layout of a circuit.
- Model and simulate digital VLSI systems using hardware design language.
- Synthesize digital VLSI systems from register-transfer or higher level descriptions
- Understand current trends in semiconductor technology, and how it impacts scaling and performance.

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Objectives
The aim of this course is to introduce key concepts and principles of computer networks. The course will use a top-down approach to study the Internet and its protocol stack. Architecture, protocol, application-examples will include email, web and media-streaming. We will cover communications services (e.g., TCP/IP) required to support such network applications. The implementation and deployment of communications services in practical networks: including wired and wireless LAN environments, will be followed by a discussion of issues of network-security and network-management. Internet’s architecture and protocols will be used as the primary examples to illustrate the fundamental principles of computer networking.

UNIT I
INTRODUCTION
OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT II
PHYSICAL LAYER
Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT III
DATA LINK LAYER

UNIT IV
NETWORK LAYER
UNIT V
TRANSPORT LAYER
Transport Services, Connection management, TCP and UDP protocols; ATM
AAL Layer Protocol.

UNIT VI
APPLICATION LAYER
Network Security, Domain name system, SNMP, Electronic Mail; the World
WEB, Multi Media.

TEXT BOOKS
   Education/PHI.
2. Data Communications and Networking – Behrouz A. Forouzan.Third
   Edition TMH.

REFERENCES
1. An Engineering Approach to Computer Networks-S.Keshav, 2nd
2. Understanding communications and Networks, 3rd Edition, W.A. Shay,
   Thomson.

Outcomes:
The student will be able to
- Analyze a communication system by separating out the different functions
  provided by the network; and some example networks.
- Understand various network topologies required for communication
- Understand that there are fundamental limits to any communications
  system;
- Understand the general principles behind addressing, routing, reliable
  transmission and other stateful protocols as well as specific examples of
  each;
- Have an informed view of both the internal workings of the Internet and of
  a number of common Internet applications and protocols.
OBJECTIVES

The student will

- Learn the fundamental concepts and applications of Digital Image Processing.
- Learn the concepts of and how to perform Intensity transformations and spatial filtering.
- Understand the relationship between Filtering in spatial and frequency domains,
- Understand the concepts of and how to perform Image restoration and reconstruction.
- Understand the concepts of different color models and Color image processing.
- Learn the concepts of Wavelets and multi-resolution processing, Image compression and Watermarking, Morphological image processing, Image segmentation, Representation and description.

UNIT-1

Introduction: Origins of digital image processing, uses digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.


UNIT-2

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of
spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering.

**Filtering in the frequency domain:** Preliminary concepts, Sampling and the Fourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform. The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation.

**UNIT-3**

**Image restoration and Reconstruction:** A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only- Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, constrained least squares filtering, geometric mean filtering, image reconstruction from projections.

**Unit-4**

**Color image processing:** color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

**Unit-5**

**Wavelets and Multi-resolution Processing:** image pyramids, sub band coding & Haar transforms multi resolution expressions, wavelet transforms in one dimensions. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.

**Image compression:** Fundamentals, various compression methods-coding techniques, digital image water marking.

**Unit-6**

**Morphological image processing:** preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology

**Image segmentation:** Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation.
TEXT BOOKS:

OUTCOMES
After going through this course the student will be able to
- Perform different transforms on image useful for image processing applications
- Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images
- Perform image restoration operations/techniques on images
- Operate effectively on color images and different color conversions on images and can code images to achieve good compression
- Do wavelet based image processing and image compression using wavelets
- Perform all morphological operations on images and can be able to do image segmentation also.
- Develop simple algorithms for image processing and use the various techniques involved in Bio Medical applications, etc.
OBJECTIVES

The student will

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization.
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems.

UNIT-I


UNIT-II


UNIT-III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control
UNIT-IV
THE MEMORY SYSTEM: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware

UNIT-V
INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication;

UNIT-VI

TEXT BOOKS:

REFERENCES:

Objectives :
- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems.
- Demonstrate the relationship between the software and the hardware and focuses on the foundational concepts that are the basis for current computer design.
Electronics & Communication Engineering

IV Year – I SEMESTER

Elective I

ELECTRONIC SWITCHING SYSTEMS

Objectives:
The student will
- Understand the means of measuring traffic.
- Understand the implication of the traffic level on system design.

UNIT -I:

UNIT -II:
Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.
Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

UNIT -III:
Signaling: Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT Signaling System no.6, CCITT Signaling System no.7, Digital Customer Line Signaling.

UNIT -IV:
Packet Switching: Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

UNIT -V:
Switching Networks: Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing, Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT -VI:

TEXT BOOKS:
1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.

REFERENCES:
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.

Outcomes
The student will be able to
- Evaluate the time and space parameters of a switched signal
- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.
ANALOG IC DESIGN
( Elective I )

OBJECTIVES
The student will be introduced to

- The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
- Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.
- The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

UNIT -I:

UNIT -II:
Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

UNIT -IV:
UNIT -V:
**Comparators:** Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

UNIT -VI:
**Oscillators & Phase-Locked Loops:** General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.
Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

Text Books:

References:

OUTCOMES
After going through this course the student will be able to
- Understand the concepts of MOS Devices and Modeling.
- Design and analyze any Analog Circuits in real time applications.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Understand of Open-Loop Comparators and Different Types of Oscillators.
OBJECT ORIENTED PROGRAMMING & OPERATING SYSTEM
(Elective I)

Course Objectives:
By the end of the course student will

- Describe the general architecture of computers
- Describe object oriented concepts
- Describe, contrast and compare differing structures for operating Systems
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

UNIT-I:
Introduction to OOP
Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP.

UNIT-II:
Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-III:

UNIT-IV:
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

UNIT-V:
Virtual Memory Management:
virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing.
UNIT-VI:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

TEXT BOOKS:
1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.

REFERENCES:
3. Operating System A Design Approach-Crowley, TMH.

Course Outcomes:
By the end of the course student will be able to

- describe the general architecture of computers
- describe object oriented concepts
- describe, contrast and compare differing structures for operating Systems.
- understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
RADAR SYSTEMS
(Elective-I)

OBJECTIVES
The student will be introduced to

- the knowledge of different Antennas systems and communication equipment required for the operation of RADAR.
- different parameters of Transmitter and Receiver of RADAR
- the concept of Doppler Effect to measure parameters of RADAR.
- different types of RADARS and applications based on the type of Transmitters, Receivers, and their functions.

Pre requisites: Antennas and wave propagation; Electromagnetics and Communications

UNIT – I

UNIT – II

UNIT – III
UNIT – IV

UNIT- V

UNIT – VI
Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes, Series versus Parallel Feeds. Applications, Advantages and Limitations.

TEXT BOOKS:

REFERENCES:

OUTCOMES
After going through this course the student will be able to
- Acquire the knowledge to apply and to design required parameters for a RADAR system.
- Apply the techniques learned, to choose suitable RADAR from the available, for the required application.
ADVANCED COMPUTER ARCHITECTURE
( Elective I )

UNIT -I:
Fundamentals of Computer Design:
Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl’s law.
Instruction set principles and examples- Introduction, Classifying instruction set- MEmory addressing- type and size of operands, Operations in the instruction set.

UNIT –II:
Pipelines:
Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.
Memory Hierarchy Design:

UNIT -III:
Instruction Level Parallelism the Hardware Approach:
Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo’s approach, Branch prediction, high performance instruction delivery- hardware based speculation.

UNIT-IV
ILP Software Approach
Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.
UNIT –V:
Multi Processors and Thread Level Parallelism:
Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT –VI:
Inter Connection and Networks:
Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

REFERENCES:
OBJECTIVES
The student will be introduced to

- the functionality of each of the components that comprise a fiber-optic communication system
- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
- the principles of single and multi-mode optical fibers and their characteristics
- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.
- Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
- Analyze and design optical communication and fiber optic sensor systems.
- the models of analog and digital receivers.

UNIT I
Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II
Fiber materials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity

UNIT III
Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT IV
Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V
Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

UNIT VI
Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS :

REFERENCES :

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

- Choose necessary components required in modern optical communications systems.
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses.
- Design, build, and demonstrate optical fiber experiments in the laboratory.
DIGITAL IC DESIGN
( Elective II )

OBJECTIVES

• The student will be able to understand the MOS Design.
• In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
• Another main object of this course is to motivate the graduate students to design and to develop the Digital Integrated Circuits for different Applications.
• The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIT-I:

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:

Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

UNIT-V:

**Interconnect:** Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

UNIT-VI:

**Semiconductor Memories:** Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

**Text Books:**


**References:**


**OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of MOS Design.
- Design and analysis of Combinational and Sequential MOS Circuits.
- Extend the Digital IC Design to Different Applications.
- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
SPEECH PROCESSING
(ELECTIVE – II)

UNIT –I:
Fundamentals of Digital Speech Processing:

UNIT –II:
Time Domain Models for Speech Processing:
Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III:
Linear Predictive Coding (LPC) Analysis:

UNIT –IV:
Homomorphic Speech Processing:

UNIT-V
Speech Enhancement:
Nature of interfering sounds, Speech enhancement techniques: Single

UNIT-VI:
Automatic Speech & Speaker Recognition:
Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System.

Hidden Markov Model (HMM) for Speech:
Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS,

Speaker Recognition:
Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:

REFERENCE BOOKS:
Artificial Neural Networks and Fuzzy Logic

(Elective II)

1. Introduction to Neural Networks


Essentials of Artificial Neural Networks

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

2. Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training
Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence
theorem, Limitations of the Perceptron Model, Applications.
Multilayer Feed Forward Neural Networks
Credit Assignment Problem, Generalized Delta Rule, Derivation of Back-propagation (BP)
Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning
Difficulties and Improvements.

3. Associative Memories

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

4. **Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)**

5. **Classical & Fuzzy Sets**
   Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, Properties, fuzzy relations, cardinalities, membership functions.

6. **Fuzzy Logic System Components**
   Fuzzification, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

 Applications :
 Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

**Text Books:**
1. Neural Netwroks, Fuzy logic , Gnenetic algorithms: synthesis and applications by Rajasekharan and Rai- PHI Publication.

**Reference Books:**
2. Neural Netwroks – James A Freeman and Davis Skapura, Pearson, 2002
3. Neural Netwroks – Simon Hykinds, Pearson Education.
4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.
   Neural Netwroks and Fuzzy Logic System by Brok Kosko, PHI Publications.
Course objectives:
The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the “modus operandi” of adversaries; which could be used for increasing software dependability.

Course outcomes:
1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Syllabus:

UNIT I: Classical Encryption Techniques
Objectives: The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense (Phishing Defensive measures, web based attacks, SQL injection & Defense techniques) TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking (ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks) (TEXT BOOK3).

UNIT II: Block Ciphers & Symmetric Key Cryptography
Objectives: The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.

Traditional Block Cipher Structure, DES, Block Cipher Design Principles,
AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations.

UNIT III: Number Theory & Asymmetric Key Cryptography
Objectives: Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems.

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat’s and Euler’s Theorems, The Chinese Remainder theorem, Discrete logarithms.


UNIT IV : Cryptographic Hash Functions & Digital Signatures
Objectives: Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature


UNIT V: User Authentication, Transport Layer Security & Email Security
Objectives: Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.

User Authentication: Remote user authentication principles, Kerberos
Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP Security & Intrusion Detection Systems
Objectives: Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:

REFERENCE BOOKS:
VLSI Laboratory

The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using CMOS 130nm Technology with necessary EDA tools (Mentor Graphics/Tanner).

List of Experiments:

1. Design and implementation of an inverter
2. Design and implementation of universal gates
3. Design and implementation of full adder
4. Design and implementation of full subtractor
5. Design and implementation of RS-latch
6. Design and implementation of D-latch
7. Design and implementation asynchronous counter
8. Design and Implementation of static RAM cell
9. Design and Implementation of differential amplifier
10. Design and Implementation of ring oscillator

Equipment Required:

1. Mentor Graphics/Tanner software-latest version
2. Personal computer with necessary peripherals.
Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments) :
1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.

Part – B (Any 5 Experiments) :
10. Characterization of LED.
12. Intensity modulation of Laser output through an optical fiber.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:
1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron
8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage
12. Probe detector
13. wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)
UNIT I

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II
INTERFERENCE: Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types. CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III
CELL SITE AND MOBILE ANTENNAS: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT IV
FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.
UNIT V
Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI
DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

TEXTBOOKS:

REFERENCES:
IV Year – II SEMESTER

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

UNIT I

UNIT II

UNIT III
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

UNIT V
Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.
UNIT VI
Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS :

REFERENCES :

OUTCOMES
The student will be able to
- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications.
- Design different transducers for measurement of different parameters.
IV Year – II SEMESTER

3+1 0 3

ELECTIVE – III

SATELLITE COMMUNICATIONS

UNIT I

UNIT II
ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT III
SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT IV
SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT V
EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations,
Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT VI


TEXT BOOKS:


REFERENCES :

MIXED SIGNAL DESIGN
(ELECTIVE – III)

OBJECTIVES
The student will be introduced to

- Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.
- In this course, students can study Data Converter Fundamentals, Nyquist Rate A/D Converters.
- Another main object of this course is to motivate the graduate students to study and to analyze the Oversampling Converters and Continuous-Time Filters.
- The concepts of Continuous-Time Filters, CMOS Transconductors Using Triode and Active Transistors and MOSFET-C Filters.

UNIT-I:
Switched Capacitor Circuits: Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT-II:
Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III:
Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV:
UNIT-V:

Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

UNIT-VI:

Continuous-Time Filters: Introduction to Gm-C Filters, Bipolar Transconductors, CMOS transconductors Using Triode and Active Transistors, BiCMOS Tran conductors, MOSFET-C Filters.

Text Books:

Reference Books:

OUTCOMES

After going through this course the student will be able to

- Understand the concepts of Switched Capacitor circuits.
- Design and analysis of Nyquist Rate A/D Converters.
- Extend the Mixed Signal Design to Different Applications.
- Concepts of Oversampling Converters and Continuous-Time Filters.
EMBEDDED SYSTEMS
(ELECTIVE – III)

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

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

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

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

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

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

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

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

Text Books:

References:
2. Embedding system building blocks By Labrosse, CMP publishers.

OUTCOMES
After going through this course the student will be able to
- Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
- Distinguish all communication devices in embedded system, other peripheral device.
- Distinguish concepts of C versus embedded C and compiler versus cross-compiler.
- Choose an operating system, and learn how to choose an RTOS.
RF CIRCUIT DESIGN
(ELECTIVE – III)

UNIT -I:
Introduction to RF Electronics:

UNIT -II:

UNIT -III:
Matching and Biasing Networks:

UNIT-IV

UNIT -V:

UNIT -VI:
Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. RF Mixers:
Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

TEXT BOOKS:


REFERENCE BOOKS:

1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.


Cloud Computing
(ELECTIVE – III)

Course Objectives: The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

Course Outcomes:
1. Understanding the key dimensions of the challenge of Cloud Computing.
2. Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization.
3. Assessing the financial, technological, and organizational capacity of employer’s for actively initiating and installing cloud-based applications.
4. Assessment of own organizations’ needs for capacity building and training in cloud computing-related IT areas.

Syllabus:
UNIT I: Systems modeling, Clustering and virtualization:
Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:
Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT III: Cloud Platform Architecture:
UNIT IV: Cloud Programming and Software Environments:

UNIT V: Cloud Resource Management and Scheduling:

UNIT VI: Storage Systems:
Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3).

TEXT BOOKS:

REFERNCE BOOK:
UNIT I
OVERVIEW OF WIRELESS SENSOR NETWORKS:

ARCHITECTURES:

UNIT II
NETWORKING Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III
MAC Protocols for Wireless Sensor Networks:

UNIT-IV
ROUTING PROTOCOLS:
UNIT-V
TRANSPORT LAYER AND SECURITY PROTOCOLS:

UNIT- VI
SECURITY IN WSNs:

SENSOR NETWORK PLATFORMS AND TOOLS:

APPLICATIONS of WSN:
Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

TEXT BOOKS:

REFERENCES:

***
SYSTEM ON CHIP
(ELECTIVE - IV)

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

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.
- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.
- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc…

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:
Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor
UNIT-V:
**Interconnect Configuration:** Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-VI:
**Application Studies / Case Studies:** SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

**Text Books:**

**Reference Books:**

**OUTCOMES**
After going through this course the student will be able to
- Know basics of System Architecture and Processor Architecture.
- Know different Types of Processors Like VLIW Processors, Superscalar Processors etc. and Basic concepts in Processor Micro Architecture.
- Distinguish Cache memory and Multilevel Caches, SOC external memory.
- Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.
LOW POWER VLSI DESIGN  
(ELECTIVE - IV)

OBJECTIVES
- The student will be able to understand the Fundamentals of Low Power VLSI Design.
- In this course, students can study low-Power Design Approaches, Power estimation and analysis.
- Another main object of this course is to motivate the graduate students to study and to analyze the Low-Voltage Low-Power Adders, Multipliers.
- The concepts of Low-Voltage Low-Power Memories and Future Trend and Development of DRAM.

UNIT-I:  

UNIT-II:  
Low-Power Design Approaches:  
Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III:  
Power estimation and analysis: SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

UNIT-IV:  
Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder’s Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power

UNIT-V:
Low-Voltage Low-Power Multipliers Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-VI:

Text Books:
1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

OUTCOMES
After going through this course the student will be able to
- Understand the concepts of Low-Power Design Approaches.
- Design and analysis of Low-Voltage Low-Power Circuits.
- Extend the Low Power Design to Different Applications.
- Understand of Low-Voltage Low-Power Memories and Basics of DRAM.
BIO-MEDICAL INSTRUMENTATION
(ELECTIVE - IV)

UNIT-I

UNIT-II

UNIT- III
Patient Care & Monitory and Measurements in Respiratory System: The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

UNIT-IV
Bio telemetry and Instrumentation for the clinical laboratory Introduction to bio telemetry, Physiological parameters adaptable to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care – The blood, tests on blood cells, chemical test, automation of chemical tests.

UNIT-V
X-ray and radioisotope instrumentation and electrical safety of medical equipment: Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of
radioisotopes, radiation therapy - Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention.

UNIT-VI

TEXT BOOK:

Reference:
2. Introduction to Bio-Medical Engineering – Domach, (Pearson)
3. Introduction to Bio-Medical Equipment Technology – Cart, (Pearson)
EMI / EMC

Pre requisites: EMTL and AWP Courses.

Objectives:
- Student shall be able to understand the root causes for Electromagnetic Noise (EMI), its sources.
- Shall be able to understand the effects of EMI and the required precautions to be taken/to be discussed with his peer group.
- Shall be able to understand the different measurement techniques of EMI (for conducted and normal) and their influences in detail.
- Shall be able to understand different compatibility techniques (EMC) to reduce/suppress EMI.
- Shall be able to understand different standards being followed across the world in the fields of EMI/EMC.


UNIT-II: EMI from apparatus, circuits and open area test sites : Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT-III: Radiated and conducted interference measurements: Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT-IV: ESD, Grounding, shielding, bonding and EMI filters : Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

UNIT-V: Cables, connectors, components: Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices.

Text Books :

References :

Outcomes-
At the end of this Course
- Students shall be able to distinguish effects of EMI and counter measures by EMC-techniques.
- Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC- norms specified by regulating authorities.
- Students shall choose career in the fields of EMI/EMC as an Engineer/Researcher/Entrepreneur in India/abroad.

IV Year – II SEMESTER

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Project & Seminar
ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRICAL AND
ELECTRONICS
ENGINEERING

For

B.Tech., FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2013-14)

JAWAHARLAL NEHRU TECHNOLOGICAL
UNIVERSITY KAKINADA
KAKINADA – 533003, ANDHRA PRADESH, INDIA.
Academic Regulations (R13) for B. Tech. (Regular)
Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 onwards

1. **Award of B. Tech. Degree**
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
   1. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
   2. The candidate shall register for 180 credits and secure all the 180 credits.

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

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<td>01</td>
<td>Electronics and Communication Engineering</td>
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<td>02</td>
<td>Electrical and Electronics Engineering</td>
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<td>Electronics and Instrumentation Engineering</td>
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<td>Electronics and Computer Engineering</td>
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<td>Metallurgical Engineering</td>
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<td>18</td>
<td>Agricultural Engineering</td>
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3. **Distribution and Weightage of Marks**

(i) The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

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

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain 3 questions and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation ( 20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.
(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. 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 conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**

1. A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

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

3. Shortage of Attendance below 65% in aggregate shall not be condoned.

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

5. Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
6. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) credits.

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

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

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

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

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement of **40% of the credits up to II year I semester from all the examinations**, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

5.4 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **40% of the credits up to III year I semester from all the examinations**, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

6. **Course pattern**

1. The entire course of study is for four academic years, all the years are on semester pattern.

2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

7. **Award of Class**

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 180 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70 but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

8. **Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

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

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.
12. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.

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

13. **General**

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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

3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

4. The University 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 University.

5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

* * * *
Academic Regulations (R13) for B. Tech.  
(Lateral entry Scheme)

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

1. **Award of B. Tech. Degree**
   A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:
   
   1.1 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

   1.2 The candidate shall register for 132 credits and secure all the 132 credits.

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

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

   A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 132 Credits from II year to IV year</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Disciplinary Action for / Improper Conduct in Examinations**

<table>
<thead>
<tr>
<th>Nature of Malpractices / Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1. (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the</td>
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</tr>
<tr>
<td>4.</td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>5.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks. Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>6.</td>
<td>Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
</tbody>
</table>
|   | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
<tr>
<td>10.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
</tr>
</tbody>
</table>
| 11. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment. | Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices).

(i) A show cause notice shall be issued to the college.
(ii) Impose a suitable fine on the college.
(iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *
Ragging Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

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

<table>
<thead>
<tr>
<th>Imprisonment upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Months</td>
<td>Rs. 1,000/-</td>
</tr>
<tr>
<td>1 Year</td>
<td>Rs. 2,000/-</td>
</tr>
<tr>
<td>2 Years</td>
<td>Rs. 5,000/-</td>
</tr>
<tr>
<td>5 Years</td>
<td>Rs. 10,000/-</td>
</tr>
<tr>
<td>10 Months</td>
<td>Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
Ragging

ABSOLUTELY NOT TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded.
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288
LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
## COURSE STRUCTURE

### I Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English - I</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics - I</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics – II (Mathematical Methods)</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Physics</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Professional Ethics and Human Values</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Engineering Drawing</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>English – Communication Skills Lab - I</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Engineering Physics Laboratory</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Engineering Physics – Virtual Labs - Assignments</td>
<td></td>
<td>2</td>
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</tr>
<tr>
<td>10</td>
<td>Engineering Workshop &amp; IT Workshop</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits** 24

### I Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – II</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics – III</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Chemistry</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Mechanics</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Electrical Circuit Analysis - I</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Computer Programming</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Engineering Chemistry Lab</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>English – Communication Skills Lab - II</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>C Programming lab</td>
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</tbody>
</table>

**Total Credits** 24

### II Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrical Circuit Analysis-II</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Thermal and Hydro Prime movers</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Basic Electronics And Devices</td>
<td>3+1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>S. No.</td>
<td>Subject</td>
<td>T</td>
<td>P</td>
<td>Credits</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>4</td>
<td>Complex Variables and Statistical Methods</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Electro Magnetic Fields</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Electrical Machines-I</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Thermal and Hydro Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Electrical Circuits Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
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<td></td>
<td><strong>22</strong></td>
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II Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental studies</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Switching Theory and Logic Design</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Pulse &amp; Digital Circuits</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Power Systems-I</td>
<td>3+1</td>
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</tr>
<tr>
<td>5</td>
<td>Electrical Machines-II</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Control Systems</td>
<td>3+1</td>
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<tr>
<td>7</td>
<td>Electrical Machines -I Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Electronic Devices &amp; Circuits Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td></td>
<td><strong>22</strong></td>
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</tbody>
</table>

III Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Managerial Economics and Financial Analysis</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Electrical Measurements</td>
<td>3+1</td>
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</tr>
<tr>
<td>3</td>
<td>Power Systems-II</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Electrical Machines-III</td>
<td>3+1</td>
<td>--</td>
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<tr>
<td>5</td>
<td>Power Electronics</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Linear &amp; Digital IC Applications</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Electrical Machines-II Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
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<tr>
<td>8</td>
<td>Control Systems Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>IPR &amp; Patents</td>
<td>3+1</td>
<td></td>
<td>2</td>
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<td><strong>Total Credits</strong></td>
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III Year – II SEMESTER

<table>
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<tbody>
<tr>
<td>1</td>
<td>Switchgear and Protection</td>
<td>3+1</td>
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### IV Year – I SEMESTER

<table>
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<th>S. No.</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>Renewable Energy Sources and Systems</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
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<tr>
<td>2</td>
<td>HVAC &amp; DC Transmission</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
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<tr>
<td>3</td>
<td>Power System Operation &amp; Control</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
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<td>4</td>
<td>Open Elective</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
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<tr>
<td>5</td>
<td>Elective – I</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Microprocessors &amp; Microcontrollers Lab</td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Electrical Simulation Lab</td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Power systems lab</td>
<td>3</td>
<td>2</td>
<td></td>
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<td></td>
<td><strong>Total Credits</strong></td>
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<td><strong>21</strong></td>
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### IV Year – II SEMESTER

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<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital Control Systems</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Elective – II</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Elective – III</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Elective – IV</td>
<td>3+1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Project</td>
<td>-</td>
<td>-</td>
<td>9</td>
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<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

**Open Elective:**
1. Energy Audit, Conservation and Management
2. Instrumentation
3. Non Conventional Sources of Energy
4. Optimization Techniques
Elective – I:
1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

Elective – II:
1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

Elective – III:
1. Electric Power Quality
2. Digital Signal Processing

Elective-IV:
1. OOPS Through Java
2. UNIX and Shell Programming
3. AI Techniques
4. Power System Reforms
5. Systems Engineering
SYLLABUS

I Year – I SEMESTER

T  P  C
3+1  0  3

ENGLISH –I
(Common to All Branches)

DETAILED TEXT-I English Essentials : Recommended Topics :

1. IN LONDON: M.K.GANDHI
   OBJECTIVE: To apprise the learner how Gandhi spent a period of three years in London as a student.
   OUTCOME: The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM
   OBJECTIVE: To make the learners rediscover India as a land of Knowledge.
   OUTCOME: The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE
   OBJECTIVE: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   OUTCOME: This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:
   OBJECTIVE: To inform the learners how to write clearly and logically.
   OUTCOME: The learner will be able to think clearly and logically and write clearly and logically.

5. MAN’S PERIL
   OBJECTIVE: To inform the learner that all men are in peril.
   OUTCOME: The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS
   OBJECTIVE: This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
OUTCOME: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. **LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man’s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME:** The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

Text Book: ‘English Essentials’ by Ravindra Publications

**NON-DETAILED TEXT:**

(From Modern Trailblazers of Orient Blackswan)  
(Common single Text book for two semesters)

1. **G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu’s example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. **G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. **Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. **Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

I Year – I SEMESTER

MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, $\sin ax$, $\cos ax$, polynomials in $x$, $e^{ax} V(x)$, $xV(x)$.
Applications: LCR circuit, Simple Harmonic motion

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac’s delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV 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.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

Subject Category
ABET Learning Objectives  a  c  e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

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

Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 6
JNTUK External Evaluation  A  B  E

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

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 6
JNTUK External Evaluation  B  E

Books:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering&lt;br&gt;b) Design &amp; conduct experiments, analyze &amp; interpret data&lt;br&gt;c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints&lt;br&gt;d) Function on multidisciplinary teams&lt;br&gt;e) Identify, formulate, &amp; solve engineering problems&lt;br&gt;f) Understand professional &amp; ethical responsibilities&lt;br&gt;g) Communicate effectively&lt;br&gt;h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context&lt;br&gt;i) Recognize need for &amp; be able to engage in lifelong learning&lt;br&gt;j) Know contemporary issues&lt;br&gt;k) Use techniques, skills, modern tools for engineering practices</td>
<td>1. Objective tests&lt;br&gt;2. Essay questions tests&lt;br&gt;3. Peer tutoring based&lt;br&gt;4. Simulation based&lt;br&gt;5. Design oriented&lt;br&gt;6. Problem based&lt;br&gt;7. Experimental (project based) based&lt;br&gt;8. Lab work or field work based&lt;br&gt;9. Presentation based&lt;br&gt;10. Case Studies based&lt;br&gt;11. Role-play based&lt;br&gt;12. Portfolio based</td>
<td>A. Questions should have: B. Definitions, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Trouble shooting type of questions F. Applications related questions G. Brain storming questions</td>
<td></td>
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</tbody>
</table>
I Year – I SEMESTER

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT II Interpolation:

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Numerical solution of Ordinary Differential equations:

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series.
Application: Amplitude, spectrum of a periodic function
UNIT V Fourier Transforms:

UNIT VI Z-transform:

BOOKS:

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Rema -rks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests 2. Essay questions</td>
<td>A. Questions should have: B. Definitions,</td>
<td></td>
</tr>
<tr>
<td>Theory</td>
<td>experiments, analyze &amp; interpret data</td>
<td>tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algorithm</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td></td>
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<tr>
<td>Drawing</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td></td>
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<tr>
<td>Others</td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
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<tr>
<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<tr>
<td></td>
<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td></td>
<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td></td>
<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td></td>
<td></td>
<td>12. Portfolio based</td>
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</table>

| Principle of operation or philosophy of concept. |
|                                               |
| C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. |
| D. Design oriented problems |
| E. Trouble shooting type of questions |
| F. Application related questions |
| G. Brain storming questions |
UNIT-I

PHYSICAL OPTICS FOR INSTRUMENTS
“Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics”.


UNIT-II

COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS
Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.


X-RAY DIFFRACTION TECHNIQUES: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg’s law.
UNIT-III

MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

“Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve.


SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London’s equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV

ACoustics and EM – fields:

Objective: The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

ACoustics: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

ELECTRO-MAGNETIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations (Calculus approach).

UNIT – V

QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.


UNIT – VI
SEMICONDUCTOR PHYSICS:
Objective: In the wake of ever increasing demand for the space and power the watch word “small is beautiful”, understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.


TEXT BOOKS
1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.)

REFERENCE BOOKS
1. ‘Introduction to solid state physics’ by Charles Kittle (Willey India Pvt. Ltd).
2. ‘Applied Physics’ by T. Bhimasenkaram (BSP BH Publications )
4. ‘Engineering Physics’ by Palanisamy (Scitech Publishers).
5. ‘Engineering Physics’ by D.K.Bhattacharya (Oxford University press).
6. ‘Engineering Physics’ by Mani Naidu S (Pearson Publications)
7. ‘Engineering Physics’ by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
I Year – I SEMESTER

T P C
3+1 0 3

Professional Ethics and Human Values

UNIT I : Human Values:

UNIT II : Engineering Ethics:

UNIT III : Engineering as Social Experimentation:

UNIT IV : Engineers’ Responsibility for Safety and Risk:

UNIT V : Engineers’ Responsibilities and Rights:
Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**

********

**Text Books:**
3. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran- Laxmi Publications
4. “Professional Ethics and Human Values” by Prof. D.R. Kiran.
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication.
Objective:
Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.
Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes. Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

REFERENCE BOOKS:
Suggested Lab Manuals:

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

UNIT 1
A. Greeting and Introductions  
B. Pure Vowels  

UNIT 2
A. Asking for information and Requests  
B. Diphthongs  

UNIT 3
A. Invitations  
B. Consonants  

UNIT 4
A. Commands and Instructions  
B. Accent and Rhythm  

UNIT 5
A. Suggestions and Opinions  
B. Intonation  

**Text Book:**

‘Strengthen your Communication Skills’  Part-A by Maruthi Publications.

**Reference Books:**

1. INFOTECH English (Maruthi Publications).
I Year – I SEMESTER

ENGINEERING PHYSICS LAB

List of Experiments
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of stretched string – Sonometer.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Thermistor characteristics – Temperature Coefficient.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect for semiconductor.

REFERENCE:
I Year – I SEMESTER

Engineering Physics
Virtual Labs - Assignments

List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL: WWW.vlab.co.in
I Year – I SEMESTER

ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP:

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

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

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

IT WORKSHOP:

Objectives: Enabling the student to understand basic hardware and software tools through practical exposure.
PC Hardware:
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

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

Productivity tools Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware
Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

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

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

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

Task 5:
Hardware Troubleshooting (Demonstration):
Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

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

Internet & Networking Infrastructure

Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are
trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7: Search Engines & Netiquette:**

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9 : MS Word Orientation:**

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

**Task 10: Creating project :** Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.**

**Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word
Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

**Task 14:** Focusing on the power and potential of Microsoft PowerPoint. Helps them learn best practices in designing and preparing PowerPoint presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

**TEXT BOOK:**

Faculty to consolidate the workshop manuals using the following references

3. Information Technology Workshop, 3e, G Praveen Babu, MV Narayana BS Publications.

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.
DETAILED TEXT-II:
Sure Outcomes: English for Engineers and Technologists
Recommended Topics:

1. TECHNOLOGY WITH A HUMAN FACE
   **OBJECTIVE**: To make the learner understand how modern life has been shaped by technology.
   **OUTCOME**: The proposed technology is people’s technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
   **OBJECTIVE**: To make the learner understand how the unequal heating of earth’s surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME**: The learner’s understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
   **OBJECTIVE**: To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME**: The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
   **OBJECTIVE**: To inform the learner of the various advantages and characteristics of water.
   **OUTCOME**: The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
   **OBJECTIVE**: In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME**: The students will learn to work hard with devotion and dedication.
6. **WORK BRINGS SOLACE**

**OBJECTIVE:** In this lesson Abdul Kalam highlights the advantage of work.

**OUTCOME:** The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book** : ‘Sure Outcomes’ by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

(From Modern Trailblazers of Orient Blackswan)  
(Common single Text book for two semesters)

1. **J.C. Bose**  
**OBJECTIVE:** To apprise of J.C.Bose’s original contributions.  
**OUTCOME:** The learner will be inspired by Bose’s achievements so that he may start his own original work.

2. **Homi Jehangir Bhaba**  
**OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.  
**OUTCOME:** The learner will be inspired by Bhabha’s achievements so as to make his own experiments.

3. **Vikram Sarabhai**  
**OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.  
**OUTCOME:** The learner will realize that development is impossible without scientific research.

4. **A Shadow- R.K.Narayan**  
**OBJECTIVE:** To expose the reader to the pleasure of the humorous story.  
**OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

UNIT I Linear systems of equations:
Application: Finding the current in an electrical circuit.
Subject Category
ABET Learning Objectives   a e k
ABET internal assessments  1 2 6 4
JNTUK External Evaluation  A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem-
Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.
Application: Free vibration of a two-mass system.
Subject Category
ABET Learning Objectives   a d e k
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- 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
Application: Moments of inertia
Subject Category
ABET Learning Objectives   a e d
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E
UNIT IV Special functions:
Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of improper integrals.
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient - Divergence - Curl - Laplacian and second order operators - Vector identities.
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Vector Integration:
Application : work done, Force
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

BOOKS:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory Design</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematica l treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Algorithms</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
<td></td>
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<tr>
<td>Drawing</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
<td></td>
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<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brain storming questions</td>
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<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td></td>
<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td></td>
<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td></td>
<td>12. Portfolio based</td>
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</tbody>
</table>
UNIT-I: WATER TECHNOLOGY
Hard Water – Estimation of hardness by EDTA method – Potable water-
Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming
and foaming, scale formation, corrosion, caustic embrittlement, turbine
deposits – Softening of water – Lime soda, Zeolite processes – Reverse
osmosis – Electro Dialysis, Ion exchange process.

Objectives : For prospective engineers knowledge about water used in
industries (boilers etc.) and for drinking purposes is useful; hence chemistry
of hard water, boiler troubles and modern methods of softening hard water is
introduced.

UNIT-II : ELECTROCHEMISTRY
Concept of Ionic conductance – Ionic Mobilities – Applications of
Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode
potentials – Nernst equation – Electrochemical series – Potentiometric
titrations – Concentration cells – Ion selective electrode – Glass electrodes –
Fluoride electrode; Batteries and Fuel cells.

Objectives : Knowledge of galvanic cells, electrode potentials, concentration
cells is necessary for engineers to understand corrosion problem and its
control; also this knowledge helps in understanding modern bio-sensors, fuel
cells and improve them.

UNIT-III : CORROSION
Causes and effects of corrosion – theories of corrosion (dry, chemical and
electrochemical corrosion) – Factors affecting corrosion – Corrosion control
methods – Cathodic protection – Sacrificial Anodic, Impressed current
methods – Surface coatings – Methods of application on metals (Hot dipping,
Galvanizing, tinning, Cladding, Electroplating, Electroless plating) – Organic
surface coatings – Paints – Their constituents and their functions.

Objectives : the problems associated with corrosion are well known and the
engineers must be aware of these problems and also how to counter them.

UNIT-IV : HIGH POLYMERS
Types of Polymerization – Stereo regular Polymers – Physical and
Mechanical properties of polymers – Plastics – Thermoplastics and thermo

Objectives: Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V : FUELS

Objectives: A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS

Objectives: With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

TEXT BOOKS

REFERENCES
Objectives:
The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work-energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

UNIT – III
Objectives: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures.
Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.
UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion


TEXT BOOKS:

REFERENCES:


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

Objectives:

i. To study the concepts of passive elements, types of sources and various network reduction techniques.

ii. To understand the behaviour of RLC networks for sinusoidal excitations.

iii. To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.

iv. To study the concept of magnetic coupled circuit.

v. To understand the applications of network topology to electrical circuits.

vi. To understand the applications of network theorems for analysis of electrical networks.

UNIT-I
Introduction to Electrical Circuits
Passive components and their V-I relations. Sources (dependent and independent) - Kirchoff’s laws, Network reduction techniques(series, parallel, series - parallel, star-to-delta and delta-to-star transformation). source transformation technique, nodal analysis and mesh analysis.

UNIT-II
Single Phase A.C Systems
Periodic waveforms (determination of rms, average value and form factor). Concept of phase angle and phase difference.
Complex and polar forms of representations, steady state analysis of R, L and C circuits.
Power Factor and its significance – Real, Reactive power and apparent Power.

**UNIT-III**

**Resonance**
Locus diagrams for various combination of R, L and C. Resonance, concept of band width and Quality factor.

**UNIT-IV**

**Magnetic Circuit**
Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.
Faraday’s laws of electromagnetic induction Concept of self and mutual inductance.
Dot convention-coefficient of coupling and composite magnetic circuit. Analysis of series and parallel magnetic circuits.

**UNIT-V**

**Network topology**

**UNIT-VI**

**Network** theorems (DC & AC Excitations)
Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman’s theorem and compensation theorem.

**Outcomes:**
Students are able to solve

i. Various electrical networks in presence of active and passive elements.

ii. Any R, L, C network with sinusoidal excitation.

iii. Any R, L, C network with variation of any one of the parameters i.e R, L, C and f.

iv. Any magnetic circuit with various dot conventions.

v. Electrical networks with network topology concepts.

vi. Electrical networks by using principles of network theorems.
TEXT BOOKS:
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

REFERENCE BOOKS:
2. Electric Circuit Analysis by K.S. Suresh Kumar, Pearson publications
3. Electric Circuits by David A. Bell, Oxford publications.
OBJECTIVES: Formulating algorithmic solutions to problems and implementing algorithms in C.

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts,
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing (vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: Two way selection: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
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 for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation

POINTERS: 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 multi-dimensional arrays, dynamic memory management functions, command line arguments.

UNIT V:
Objective: Understanding miscellaneous aspects of C

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.

BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations

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

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
3. Programming in C, A practical approach Ajay Mittal PEARSON.
4. The C programming Language by Dennis Richie and Brian Kernighan

Reference Books and web links:
3. Programming in C, Reema Thareja, OXFORD.
List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.
2. Trial experiment – Estimation of HCl using standard Na₂CO₃ solutions
3. Estimation of KMnO₄ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K₂Cr₂O₇ solution.
5. Estimation of Copper using standard K₂Cr₂O₇ solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKS

I Year – II SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6    Body language
UNIT 7    Dialogues
UNIT 8    Interviews and Telephonic Interviews
UNIT 9    Group Discussions
UNIT 10   Presentation Skills
UNIT 11   Debates

Text Book:
‘Strengthen your Communication Skills’ Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications).
I Year – II SEMESTER

C PROGRAMMING LAB

Exercise 1

a) Write a C Program to calculate the area of triangle using the formula
   \[ \text{area} = \left( \frac{s}{2} \right)^{1/2} \left( s(s-a)(s-b)(s-c) \right)^{1/2} \] where \( s = \frac{(a+b+c)}{2} \)

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.

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

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

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

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

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

c) Write a C Program to check whether the given number is Armstrong number or not.
Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a linear search.
c) Write a C program to implement binary search

Exercise 6
a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 7
Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string in to given main string from a given position.
   ii. To delete n Characters from a given position in a given string.
   iii. To replace a character of string either from beginning or ending or at a specified location.

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:
   i) Reading a complex number          ii) Writing a complex number
   iii) Addition of two complex numbers iv) Multiplication of two complex numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions.
    - to concatenate two strings
    - to append a string to another string
    - to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions.
    - to find the length of a string
    - to find whether a given string is palindrome or not
Exercise 11
a) Write a C functions to find both the largest and smallest number of an
array of integers.
b) Write C programs illustrating call by value and call by reference concepts.

Exercise 12
Write C programs that use both recursive and non-recursive functions for the
following
i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given
    integers.
iii) To find Fibonacci sequence

Exercise 13
a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers

Exercise 14
a) Write a C program consisting of Pointer based function to exchange
    value of two integers using passing by address.
b) Write a C program to swap two numbers using pointers.

Exercise 15
Examples which explores the use of structures, union and other user defined
variables.

Exercise 16
a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines
   in a file.
c) Write a C Program to merge two files into a third file. The names of the
   files must be entered using command line arguments.
Preamble:
This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

Objectives:

i. To study the concepts of balanced three-phase circuits.

ii. To study the concepts of unbalanced three-phase circuits.

iii. To study the transient behaviour of electrical networks with DC, pulse and AC excitations.

iv. To study the performance of a network based on input and output excitation/response.

v. To understand the realization of electrical network function into electrical equivalent passive elements.

vi. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

UNIT-I Balanced Three phase circuits
Phase sequence- star and delta connection - relation between line and phase voltages and currents in balanced systems - analysis of balanced three phase circuits - measurement of active and reactive power in balanced three phase systems.

UNIT-II Unbalanced Three phase circuits
Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.
UNIT-III  Transient Analysis in DC and AC circuits
Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

UNIT-IV  Two Port Networks
Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Cascaded networks - poles and zeros of network functions.

UNIT-V  Network synthesis
Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

UNIT-VI  Fourier analysis and Transforms
Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.
Fourier integrals and Fourier transforms – properties of Fourier transforms and application to electrical circuits.

Outcomes:

i. Students are able to solve three- phase circuits under balanced condition.
ii. Students are able to solve three- phase circuits under unbalanced condition.
iii. Students are able find out transient response of electrical networks with different types of excitations.
iv. Students are able to estimate the different types of two port network parameters.
v. Students are able to represent electrical equivalent network for a given network transfer function.
vi. Students are able to extract different harmonics components from the response of a electrical network.
Text Books:
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

Reference Books:
1. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
2. Circuits by A.Bruce Carlson , Cengage Learning Publications.
5. Electric Circuits by David A. Bell, Oxford publications.
II Year – I SEMESTER

THERMAL AND HYDRO PRIME MOVERS

Part-A: Thermal prime movers

Course Objectives: To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.

UNIT I:

Objectives: To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.


UNIT II:

Objectives: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.

UNIT III:
Objectives: To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.


Part-B: Hydro prime movers

UNIT IV:
Objectives: To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.


UNIT V:
Objectives: To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

HYDRAULIC TURBINES: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

UNIT VI:
Objectives: To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

HYDRO POWER: Components of Hydro electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power, prediction of load.
Text Books:
1. Thermal Engineering by Rajput, Lakshmi publications

Reference Books:
Preamble: This course introduces the concepts of semi-conductor physics and operation of various semi-conductor devices. Realization of rectifiers, amplifiers and oscillators using semi-conductor devices and their analysis is also introduced in this course.

Unit-I:
Objective: To learn the basics of semiconductor physics.

Outcome:
Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.

Unit-II:
Objective: To study the construction details, operation and characteristics of various semiconductor diodes.

Junction Diode Characteristics
Operation and characteristics of p-n junction diode. Current components in p-n diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic), energy band diagram of p-n diode.

Special Diodes: Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode.

Outcome:
Students are able to explain the operation and characteristics of PN junction diode and special diodes.
Unit-III:

Objective:
To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.

Rectifiers and Regulators
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, $\Pi$- section filter, and comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators, overload voltage protection.

Outcome:
Ability to understand operation and design aspects of rectifiers and regulators.

Unit-IV:

Objective:
To study the characteristics of different bipolar junction transistors and their biasing stabilization and compensation techniques. To analyze transistor amplifiers using $h$-parameters.

Transistors

Outcome:
Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.

Unit- V:

Objective:
To understand the basics of FET, Thyristors, Power IGBTs and Power MOSFETs.

Power semiconductor devices
Principle of operation and characteristics of Thyristors, Silicon control
rectifiers, power IGBT and power MOSFET their ratings. Comparison of power devices.

**FET:** JFET Characteristics (Qualitative explanation), MOFET Characteristics–static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

**Outcome:**
Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.

**Unit VI :**

**Objective:**
To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

**Amplifiers and oscillators**
Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers.
Power Amplifiers – Classification, push-pull amplifiers, Introduction to harmonics (distortion factor).

**Outcome:**
Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.

**TEXTBOOKS:**
2. Electronics devices and circuits by Atul P. Godse, Uday, Bakshi, Technical Publication.

**REFERENCE BOOKS:**
1. Electronic Devices and Circuits by David A. Bell, Oxford University Press.
II Year – I SEMESTER  

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COMPLEX VARIABLE AND STATISTICAL METHODS

UNIT-I Functions of a complex variable:

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT-II Integration and Series Expansions

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Integration using Residues:
Types of Singularities: Isolated, pole of order m, essential - Residues – Residue theorem( without proof) - Evaluation of real integrals of type (a) (b) (c)

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Conformal Mapping:
Transformation by exp z, lnz, z^2, z^n(n positive integer), Sin z, cos z, z + a/z- Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles.
UNIT V Sampling Distributions:
Review of Normal distribution - Population and samples - Sampling distribution of mean (with known and unknown variance), proportion, variances - Sampling distribution of sums and differences - Point and interval estimators for means, variances, proportions.

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

Books:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Theory Design Analysis Algorithm Drawing Others</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
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<td></td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definition of operation or philosophy of concept.</td>
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<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivation, analysis, synthesis, numerical problems with inference.</td>
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<td></td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<td></td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<td></td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Applications related questions</td>
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<td>g) Communicate effectively</td>
<td>7. Experimental (project based) based</td>
<td>G. Brain storming questions</td>
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<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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</table>
Electromagnetic fields is the foremost pre-requisite course for most of the subjects in Electrical Engineering. Either in the enunciation of basics of electrical elements R, L and C that are the building blocks of any electrical device or in the illustration of Energy transfer from mechanical to electrical and vice versa its role is crucial. This course also includes the famous works of Coulomb, Ampere, Faraday, Maxwell etc. to the field of Electrical Engineering.

UNIT – I  Electrostatics:
Objective:
To study the production of electric field and potentials due to different configurations of static charges.

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 – Maxwell’s first law, \( \text{div} ( \mathbf{D} ) = \rho \) – Laplace’s and Poisson’s equations and Solution of Laplace’s equation in one variable.

Outcome: Ability to calculate electric field and potentials using guass’s law or solving Laplace’s or Possion’s equations.

UNIT – II  Conductors – Dielectrics and Capacitance:
Objective:
To study the properties of conductors and dielectrics, calculate the capacitance of different configurations and understand the concept of conduction and convection current densities.

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 – Polarization – Boundary conditions between conduction to Dielectric and dielectric to dielectrics capacitance – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm’s law in point form – Equation of continuity.
**Outcome:** Learn how to calculate capacitance, energy stored in dielectrics and get’s the concept of conduction and convection currents.

**UNIT – III  Magneto statics and Ampere’s Law:**
**Objective:**
To study the magnetic fields produced by currents in different configurations, application of ampere’s law and the Maxwell’s second and third equations.

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

**Outcome:**
Ability to find magnetic field intensity due to current, the application of ampere’s law and the Maxwell’s second and third equations.

**UNIT – IV  Force in Magnetic fields:**
**Objective :**
To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.

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

**Outcome:**
Students can calculate the magnetic forces and torque produced by currents in magnetic field.

**UNIT – V  Self and Mutual inductance:**
**Objective :**
To develop the concept of self and mutual inductances and the energy stored.
Self and Mutual inductance – determination of self-inductance of a solenoid and 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.

Outcome:
Will the able to calculate self and mutual inductances and the energy stored in the magnetic field.

UNIT – VI Time Varying Fields:
Objective:
To study time varying and Maxwell’s equations in different forms and Maxwell’s fourth equation for the induced Emf.


Outcome:
Students will gain knowledge on time varying fields and get ability to calculate induced Emf. Concepts of displacement current and Poynting vector and associated problems are solved.

TEXT BOOKS:

REFERENCE BOOKS
Preamble:
This is a basic course on rotating electrical machines. This course covers the topics related to principles, performance, applications and design considerations of dc machines.

Learning objectives:

i. Appreciate the principles of electromagnetic energy conversion and understand the construction details of DC machine.

ii. Understand the principle of operation and performance of DC generators.

iii. Learn the characteristics and performance of DC generators.

iv. Learn the characteristics and performance of DC motors.

v. Learn the speed control and testing methods of DC motors.

vi. Learn the basic ideas of design of DC machines.

UNIT–I:
Electromechanical Energy Conversion
Introduction to S.I Units - principles of electromechanical energy conversion – forces and torque in magnetic field systems – energy balance- singly excited machine- magnetic force - co-energy – multi excited magnetic field system-construction features of conventional and modern DC machines.

UNIT–II:
D.C. Generators – I

UNIT–III:
D.C. Generators – II
Methods of excitation- self excited and separately excited-types of generators build-up of emf - open circuit characteristics-critical field resistance-critical speed-causes for failure to self excitation-remedial measures – Internal and
external characteristics of separately excited, shunt, series, compound generators-applications, losses and efficiency.

UNIT–IV:
D.C. Motors

UNIT–V:
Speed Control and Testing of D.C. Machines
Speed control by armature voltage and field flux control – testing of DC machines - brake test, Swinburne’s method – principle of regenerative or Hopkinson’s method - retardation test -- separation of losses – methods of electrical braking: plugging, dynamic and regenerative.

UNIT–VI:
Design of D.C. Machines
Design concept - output equation - choice of specific electric and magnetic loadings – separation of D and L - estimation of number of conductors/ turns - coils - armature slots – conductor dimension – slot dimension - choice of number of poles – length of air gap.

Learning outcomes:

i. Able to explain the concepts of electromagnetic energy conversion.
ii. Able to explain the operation of dc generator, armature reaction and commutation.
iii. Able to analyze the characteristics and performance of dc generators.
iv. Able to explain the torque developed and performance of dc motors.
v. Able to analyze the speed control and testing methods of dc motors.
vi. Able to propose design aspects of a dc machine.

TEXT BOOKS:
1. Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charles kingsley,Stephen D.Umans, TMH
REFERENCE BOOKS:
3. The Performance and Design of DC machines - Albert E. Clayton.
II Year – I SEMESTER  

THERMAL AND HYDRO LAB

Course Objective:
To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

NOTE: To conduct a minimum of 12 experiments by conducting a minimum of six from each section.

SECTION A - THERMAL ENGINEERING LAB
1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test on 4-stroke Diesel engine.
3. I.C. Engines performance test on 2-stroke petrol engine.
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi-cylinder petrol engine
5. Determination of FHP by retardation and motoring test on IC engine
7. Economical speed test of an IC engine
8. Study of boilers

SECTION B – HYDRAULIC MACHINES LAB
1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.
7. Calibration of Venturimeter.
9. Determination of loss of head due to sudden contraction in a pipeline.
Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin’s and Norton’s Theorems.
2) Verification of Superposition theorem and Maximum Power Transfer Theorem.
3) Verification of Compensation Theorem.
4) Verification of Reciprocity, Millmann’s Theorems.
5) Locus Diagrams of RL and RC Series Circuits.
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling.
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Measurement of Active Power for Star and Delta connected balanced loads.
11) Measurement of Reactive Power for Star and Delta connected balanced loads.
Course Learning Objectives:
The objectives of the course is to impart
1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

Course Outcomes:
The student should have knowledge on
1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.
Syllabus:

UNIT - I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II
Natural Resources: Natural resources and associated problems
Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.
Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

UNIT - IV
Environmental Pollution: Definition, Cause, effects and control measures

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**


**UNIT - VI**

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**


**Reference:**


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II Year – II SEMESTER

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SWITCHING THEORY AND LOGIC DESIGN

**UNIT – I**

**REVIEW OF NUMBER OF SYSTEMS & CODES:**

i) Representation of numbers of different radix, conversion from one radix to another radix, r-1’s compliments and r’s compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

**UNIT – II**

**MINIMIZATION TECHNIQUES:**

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

**UNIT – III**

**COMBINATIONAL LOGIC CIRCUITS DESIGN :**

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

**UNIT – IV**

**INTRODUCTION OF PLD’s:**

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.
UNIT – V

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

UNIT – VI

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

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

REFERENCE BOOKS:
1. Modern Digital Electronics by RP Jain, TMH.
UNIT-I
Linear Wave Shaping: High pass, low pass RC circuits-response to sinusoidal, step, pulse, square and ramp inputs. RC circuit as differentiator and integrator.
Attenuators: Basic attenuator circuit and compensated attenuator circuit.
Switching characteristics of devices: Diode as a switch, transistor as a switch-transistor at cutoff, the reverse collector saturation current $I_{CBO}$, Its variation with the junction temperature. The transistor switch in saturation. Design of transistor switch.

UNIT-II
Non linear wave shaping: Diode clippers, Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation, diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input, clamping circuit theorem-practical clamping circuit.

UNIT-III
Multi vibrators:
Bistable multi vibrators:
Monostable multi vibrator:
Basic circuit-collector coupled monostable multivibrator- emitter coupled monostable multivibrator-triggering of monostable multivibrator.
Astable multi vibrator:
The Astable collector coupled multivibrator, the Astable emitter coupled multivibrator.

UNIT-IV
Digital logic circuits:Introduction, positive and negative logic, Diode OR gate, Diode AND gate, An inverter circuit with transistor, DTL, TTL, ECL,
AOI logic, NMOS logic, PMOS logic, CMOS logic-analysis and problem solving.

NIT-V

Time base generators:

Voltage time base generators: Introduction, definitions of sweep speed error, displacement error, transmission error, various methods of generating time- base waveforms, UJT time base generator, transistor constant current sweep.

Miller time base generators: General considerations, The miller sweep-general considerations of bootstrap time base generator-basic principles, transistor bootstrap time base generator.

UNIT-VI

Synchronization and frequency division:

Pulse synchronization of relaxation devices, frequency division of the sweep circuit-synchronization of Astable multi, Monostable multivibrator, synchronization of sweep circuit with symmetrical signals-sine wave frequency division with a sweep circuit.

Sampling Gates: Basic operating principle, Unidirectional diode gate circuits, bi-directional gates using transistors. A bidirectional diode gate, Four- diode gate.

Text books:


References:

4. Pulse and digital circuits by Anandkumar, PHI.
II Year – II SEMESTER  

POWER SYSTEMS-I

Preamble:
Electrical Power plays significant role in day to day life of entire mankind. The aim of this course is to allow the students to understand the concepts of the generation and distribution of power along with economic aspects.

Learning objectives:
i. To study the principle of operation and function of different components of a thermal power station.
ii. To study the principle of operation and function of different components of a Nuclear power station.
iii. To study the concepts of DC and AC distribution systems along with voltage drop calculations.
iv. To study the constructional details, principle of operation and function of different components of an Air and Gas Insulated substations.
v. To study the constructional details and classification of cables with necessary numerical calculations.
vi. To study the concepts of different types of load curves and types of tariffs applicable to consumers.

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

UNIT-II Nuclear Power Stations
Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.
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 both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution, comparison of DC and AC distribution.

UNIT-IV  Substations
Classification of substations: Air Insulated Substations - Indoor & Outdoor substations, Substations layouts of 33/11 kV showing the location of all the substation equipment.
Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.
Gas Insulated Substations (GIS) – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, constructional aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-V  Underground Cables
Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable, Numerical Problems.

UNIT-VI Economic Aspects of Power Generation & Tariff
Economic Aspects - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants, Numerical problems.

Learning Outcomes:
  i. Students are able to identify the different components of thermal power plants.
ii. Students are able to identify the different components of nuclear Power plants.

iii. Students are able to distinguish between AC & DC distribution systems and also estimate voltage drops in both types of distribution systems.

iv. Students are able to locate the different components of an air and gas insulated substations.

v. Students are able to identify single core and multi core cables with different insulating materials.

vi. Students are able to analyse the effect of load factor, demand factor and diversity factor on the cost of generation of electrical power and also able to identify the types of tariff applicable to consumers based on their load demand.

TEXT BOOKS:


REFERENCE BOOKS:


2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.
II Year – II SEMESTER  

ELECTRICAL MACHINES – II

Preamble:
This course covers the topics on single-phase transformers, three-phase transformers and 3-phase induction motor which have wide application in power systems. The main aim of the course is to provide detail concepts, operation and performance of transformers and 3-phase induction motors. A complete design procedure for the design of transformers and 3-phase induction motors can be developed based on basic concepts discussed in unit-VI.

Learning objectives:

i. Appreciate the concept of operation and performance of single-phase transformers.

ii. Understand the methods of testing of single-phase transformer.

iii. Distinguish between single-phase and three-phase transformers.

iv. Understand the concept of operation and performance of 3-phase induction motor.

v. Appreciate the relation between torque and slip, performance of induction motor and induction generator.

vi. Understand the basic concepts of design of transformers and 3-phase induction motors.

UNIT-I
Single-phase Transformers
Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

UNIT-II
Single-phase Transformers Testing
Tests on single phase transformers – open circuit and short circuit tests – Sumpner’s test – separation of losses – parallel operation with equal voltage
ratios – auto transformer - equivalent circuit – comparison with two winding transformers.

UNIT-III
3-Phase Transformers
Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

UNIT-IV
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 standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their inter relationship – equivalent circuit – phasor diagram.

UNIT-V
Characteristics, starting and testing methods of Induction Motors
Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging - no load and blocked rotor tests - circle diagram for predetermination of performance - methods of starting – starting current and torque calculations – induction generator operation.

UNIT-VI
Design of transformer and 3-phase induction motor
Transformer: Design concept – output equation – choice of windings – calculation of number of turns – length of mean turn of winding - calculation of resistance and leakage reactance.

Learning outcomes:
 i. Able to explain the operation and performance of single phase transformer.
 ii. Able to explain the regulation losses and efficiency of single phase transformer.
iii. Able to explain types of three phase transformer connection, tap changing methods and 3-phase to 2-phase transformation.

iv. Able to explain the operation and performance of three phase induction motor.

v. Able to analyze the torque-speed relation, performance of induction motor and induction generator.

vi. Able to explain design procedure for transformers and three phase induction motors.

TEXT BOOKS:


REFERENCE BOOKS:

Preamble:
This course introduces the elements of linear control systems and their analysis. Classical methods of design using frequency response are included. The state space approach for modeling and analysis is the added feature of this course.

UNIT – I:
Learning Objective:
To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.

MATHEMATICAL MODELING OF CONTROL SYSTEMS
Open Loop and closed loop control systems and their differences, Classification of control systems, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula.

Outcome:
Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.

UNIT-II:
Learning Objective:
To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.

TIME RESPONSE ANALYSIS
Outcome:
Capability to determine time response specifications of second order systems and to determine error constants.

UNIT – III:
Learning Objective :
To investigate the stability of closed loop systems using Routh’s stability criterion and the analysis by root locus method.

STABILITY AND ROOTLOCUS TECHNIQUE

Outcome:
Acquires the skill to analyze absolute and relative stability of LTI systems using Routh’s stability criterion and the root locus method.

UNIT–IV:
Learning Objective :
To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.

FREQUENCY RESPONSE ANALYSIS
Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

Outcome:
Capable to analyze the stability of LTI systems using frequency response methods.

UNIT–V:
Learning Objective :
To discuss basic aspects of design and compensation of linear control systems using Bode plots.

CLASSICAL CONTROL DESIGN TECHNIQUES
Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

Outcome:
Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
UNIT–VI:

Learning Objective:
Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS
Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it’s Properties – Concepts of Controllability and Observability.

Outcome:
Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.

TEXT BOOKS:
1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition

REFERENCE BOOKS:
Any 10 of the following experiments are to be conducted:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson’s test on DC shunt machines. Predetermination of efficiency.
7. Swinburne’s test and Predetermination of efficiencies as Generator and Motor.
8. Speed control of DC shunt motor by Field and armature Control.
10. Load test on DC series generator. Determination of characteristics.
II Year – II SEMESTER

ELECTRONIC DEVICES & CIRCUITS LAB

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

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

**PART C: Equipment required for Laboratory**
1. Boxes
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes
7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade Résistance Boxes/Rheostats
10. Decade Capacitance
III Year – I SEMESTER  

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I:  
(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting)  
Introduction to Managerial Economics and demand Analysis:  
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II:  
(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)  
Production and Cost Analyses:  
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III:  
(*The Learning Objective of this Unit is to understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)  
Introduction to Markets, Theories of the Firm & Pricing Policies:  
(** One has to understand the nature of different markets and Price Output determination under various market conditions)

Unit – IV:
(*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)

Types of Business Organization and Business Cycles:
(**One should equipped with the knowledge of different Business Units)

Unit – V:
(*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)
(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

Unit – VI:
(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective
** Learning Assessment

TEXT BOOKS


REFERENCES:

1. V. Maheswari : Managerial Economics, Sultan Chand.
Preamble:
This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

Learning Objectives:
- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy.
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns.

UNIT–I:
Measuring Instruments
UNIT –II:
Measurement of Power and Energy

UNIT – III:
Potentiometers

UNIT – IV:
Measurements of Parameters

UNIT – V:
Magnetic Measurements

UNIT – VI:
Digital Meters

**Learning Outcomes:**

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

**Text Books:**

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

**Reference Books:**

2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements by Forest K. Harris. John Wiley and Sons
Preamble:
This course is an extension of power systems–I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

Learning Objectives:
- To compute inductance and capacitance of transmission lines and to understand the concepts of GMD, GMR.
- To study short and medium length transmission lines, their models and performance computation.
- To study the performance and modeling of long transmission lines.
- To study the transient on transmission lines.
- To study the factors affecting the performance of transmission lines and power factor improvement methods.
- To discuss sag and tension computation of transmission lines as well as to study the over head insulators.

UNIT–I:
Transmission Line Parameters

UNIT–II:
Performance of Short and Medium Length Transmission Lines
Classification of Transmission Lines – Short, medium, long line and their model representations – Nominal-T– Nominal-Pie and A, B, C, D Constants
for symmetrical and Asymmetrical Networks– Numerical Problems–Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

UNIT–III:
Performance of Long Transmission Lines

UNIT – IV:
Power System Transients

UNIT–V:
Various Factors Governing the Performance of Transmission line

UNIT–VI:
Sag and Tension Calculations and Overhead Line Insulators

Learning Outcomes:
• Able to understand parameters of various types of transmission lines for using calculation and behavior during different operating conditions.
• Able to understand the insight into specific transmission lines short and medium type which would have application in medium and high voltage power transmission systems.

• Student will be able to understand the surge propagation, reflection and refraction in transmission lines. such output will be useful in protecting transmission line insulators and designing level of insulation coordination at various high voltages.

• Will be able to utilize it for understanding the surge behaivour of transmission line for protection of connects equipments, viz. power transformer and system connected shunt reactors.

• Will be able to understand various phenomenon related to charged line transmitting different level of power.

• Will be able to understand physical and geometrical parameters of transmission line for safe and efficient performance during operating condition of voltage and power.

Text Books:


Reference Books:

Preamble:
This course essentially covers ac machines. It covers topics related to principle of operation, constructional features and starting of single phase induction motors and three phase synchronous motors. In addition, it also covers voltage regulation and parallel operation of synchronous generators.

Learning Objectives:
- To study the application of “Double revolving field” theory for single – phase induction motor and appreciate the function and application of a.c series motor.
- To discuss e.m.f generation principle of synchronous generator and armature reaction effect.
- To study the effect of load at different power factors, methods of predetermination of regulation for non– salient and salient pole generators.
- To study the parallel operation and the concepts of transfer of real and reactive powers.
- To understand the operation and performance of synchronous motor.
- To study the power circle diagrams and methods of starting of synchronous motor.

UNIT – I:
Single Phase Motors

UNIT–II:
Synchronous generator construction and operation
UNIT – III:
Voltage regulation of synchronous generator

UNIT –IV:
Parallel operation of synchronous generators
Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing – Transfer of real and reactive power– Numerical problems.

UNIT–V:
Synchronous motor – operation
Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque– Variation of current and power factor with excitation – Synchronous condenser – Mathematical analysis for power developed– Numerical problems.

UNIT – VI:
Synchronous motor performance and starting
Excitation and power circles – Hunting and its suppression – Methods of starting – Synchronous induction motor.

Learning outcomes:
At the end of the course the student should be able to

- Analyze the performance of single phase induction and ac series motors.
- Explain the structure of synchronous machines and design the windings.
- Develop solutions for regulation of both non salient pole and salient pole synchronous generators.
- Explain the role of synchronous generators operation when connected to an infinite bus or when operating in parallel.
- Analyze the performance of synchronous motor for development of torque and power factor correction.
- Explain hunting phenomenon and methods of starting of synchronous motor.
Text Books:


Reference Books:

Preamble:
The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:

- To study the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- To design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters and dual converter.
- To analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

UNIT–I:
Power Semi Conductor Devices
UNIT–II:
Phase Controlled Converters – Single Phase

UNIT–III:
Single Phase Bridge Converter and Harmonic Analysis Fully controlled converters
Semi Converters (Half Controlled):
Operation with R, RL and RLE loads – Harmonic analysis for input current waveform in a system with a large load inductance –Calculation of input power factor.

UNIT–IV:
Three Phase AC–DC Bridge Converters

UNIT – V:
AC–AC and DC–DC Converters

UNIT – VI:
DC–AC Inverters
Inverters
Learning Outcomes:
Student should be able to

- Explain the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- Design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters and dual converter.
- Analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- Explain the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

Text Books:
2. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.

Reference Books:
Preamble:
All Electronic devices developed in circuit Concepts. Thus all analog circuits developed on circuit Concept basis. But the advancement of Technology in Fabrication Field gain prominence and all discrete components are fabricated using I.C Technology. On a Single chip millions of transistors are fabricated using Very Large Scale IC. In This context Operational Amplifies which is an analog device plays an important role for Analog IC Design.
Operational Amplifies performs Algebraic operations, Logarithmic Operations, Trigonometric Operations etc. Therefore these Operational Amplifiers design goes into System design instead of circuit design. So Linear IC applications plays vital role in the electronic field Starting from home appliances to Super computers.

Learning Objectives:
After completion of this course, the reader should be able to
- Draw a block diagram representing a typical op-amp with various definitions.
- Draw and explain the open-loop configuration and feedback configuration and can determine Voltage gain, the input resistance, the output resistance.
- Differentiate between Ideal and Non-Ideal Op-Amp, Determination of closed loop voltage gain, the input resistance, the output resistance for Non-Ideal Op-Amp Circuits.
- Perform various mathematical Operations, Trigonometric & Logarithmic Operations, and Instrumentation Amplifier with relevant Circuits.
- Study of 555 timer & its applications using Astable and Monostable Operations.
- Can design various types of Active Filters such as LPF, HPF, BPF, BRF, NBPF, Notch Filter, ALL pass filters.
- Study the operation & applications of PLA.
- Explain the operation of A/D and D/A Converters.
UNIT–I:

**Introduction To Operational Amplifier**

UNIT–II:

**OP–AMP Parameter**

UNIT–III

**Ideal Operational Amplifier Theory and Basic Circuits**

UNIT–IV:

multiplier role of each pin frequency translation– AM–FM and FSK demodulators.

UNIT–V:
Active filters

UNIT–VI:
D to A and A to D Convertors
Analog to Digital Convertors
Introduction–Specifications–Parallel comparator type–Counter type–Dual slope–Successive approximation type ADCs– Merits and demerits of each type, Comparison of different types.

Learning Outcomes:

- After completion of this course student can able to differentiate “Analog Circuits & Digital Circuits”.
- The course content gives an insight in to the fundamentals so that one can design the “Linear Circuits” with their own innovative skills.
- Those who are taken this course can specialize in this subject in their Post Graduation. It is a challenging task for the individual to exhibit his logical skills & Analytical ability.
- They can design their own circuits which may be useful for current industry needs.

Text Books:
1. OP–AMPS and liner integrator circuits by Ramakanth A Gayakwad (PHI).
2. Linear Integrated Circuits by D.Roy chowdary, New age international.

Reference Books:

2. Analog Electronics – L.K. Maheshwari, PHI.
3. Linear Integrated circuits by S. Salivahan, TMH.
Learning objectives:

- To predetermine the efficiency and regulation of transformers and assess their performance.
- To predetermine the regulation of three–phase alternator by various methods, find \( \frac{X_d}{X_q} \) ratio of alternator and assess the performance of three–phase synchronous motor.
- To perform various tests on Induction motor for assessing its performance.

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner’s test on single phase transformers
3. Scott connection of transformers
4. No–load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & M.M.F. Methods.
7. Equivalent Circuit of a single phase induction motor
8. Determination of \( X_d \) and \( X_q \) of a salient pole synchronous machine

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

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three–phase alternator by Potier triangle method.
5. Efficiency of a three–phase alternator
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.


**Learning outcomes:**

- Able to predetermine the efficiency and regulation of transformers and assess their performance.
- Able to predetermine the regulation of three–phase alternator by various methods, find \( \frac{X_d}{X_q} \) ratio of alternator and assess the performance of three–phase synchronous motor.
- Able to perform various tests on Induction motor for assessing its performance.
III Year – I SEMESTER
T P C
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CONTROL SYSTEMS LAB

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

Any 10 of the following experiments are to be conducted:
1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor
13. Potentiometer as an error detector

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

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INTELLECTUAL PROPERTY RIGHTS AND PATENTS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

UNIT VI

REFERENCE BOOKS:
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
Preamble:
In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

Learning objectives:

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

UNIT–I:
Circuit Breakers
UNIT–II:
Electromagnetic Protection

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

UNIT–IV:
Feeder and Bus bar Protection

UNIT–V:
Static and Digital Relays
Static relays: Static relay components– Static over current relay– Static distance relay– Micro processor based digital relays.

UNIT–VI:
Protection against over voltage and grounding
Learning Outcomes:

- To be able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF₆ gas type.
- Ability to understand the working principle and constructional features of different types of electromagnetic protective relays.
- Students acquire in depth knowledge of faults that is observed to occur in high power generator and transformers and protective schemes used for all protections.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Generates understanding of different types of static relays with a view to application in the system.
- To be able to understand the different types of over voltages appearing in the system, including existing protective schemes required for insulation co–ordination.

Text Books:

2. Power system protection- Static Relays with microprocessor applications. by T.S. Madhava Rao, TMH
3. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications

Reference Books:


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Preamble:
Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, assembly language programming and interfacing of 8051 microcontroller and its application in industry are also covered in this course.

Learning objectives:
- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices.
- To understand how to develop cyber physical systems

UNIT–I:
**Introduction to Microprocessor Architecture**

UNIT–II:
**Minimum and Maximum Mode Operations**
Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.
UNIT–III:
**Assembly Language Programming**

UNIT–IV:
**I/O Interface**

UNIT–V:
**Introduction to 8051 Micro Controller**

UNIT–VI:
**Cyber physical systems and industrial applications of 8051**
Applications of Micro Controllers– Interfacing 8051 to LED’s–Push button–Relay’s and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC Interfacing.

Learning Outcomes:
- To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability
• To be able to program mp and mc
• To be able to interface mp and mc with other electronic devices
• To be able to develop cyber physical systems

Text Books:


Reference Books:

Preamble:
This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

Learning objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

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

UNIT – II:
Electric Heating
Advantages and methods of electric heating—Resistance heating induction heating and dielectric heating.
Electric Welding
Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

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

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

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

UNIT – VI:
Electric Traction – II
Calculations of tractive effort–power–Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors.

Learning Outcomes:
- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
• Able to determine the speed/time characteristics of different types of traction motors.
• Able to estimate energy consumption levels at various modes of operation.

Text Books:

Reference Books:
Preamble:
The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of $Z_{bus}$ and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

Learning Objectives:
- To study the development of impedance diagram (p.u) and formation of $Y_{bus}$
- To study the Gauss Seidel, Newton raphson, decoupled and fast decoupled load flow methods.
- To study the concept of the $Z_{bus}$ building algorithm.
- To study short circuit calculation for symmetrical faults.
- To study the effect of unsymmetrical faults.
- To study the rotor angle stability analysis of power systems.

UNIT –I:
Per Unit Representation & Topology
Per Unit Quantities–Single line diagram– Impedance diagram of a power system – Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of $Y$–bus matrix by singular transformation and direct inspection methods.

UNIT –II:
Power Flow Studies
UNIT – III:
Z–Bus formulation
Formation of Z–Bus: Partial network– Algorithm for the Modification of $Z_{bus}$
Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems).

UNIT – IV:
Symmetrical Fault Analysis
3–Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations.

UNIT – V:
Symmetrical Components & Fault analysis

UNIT – VI:
Power System Stability Analysis

• Able to draw an impedance diagram for a power system network.
• Able to form a $Y_{bus}$ matrix for a power system network with or without mutual couplings.
• Able to find out the load flow solution of a power system network using different types of load flow methods.
• Able to formulate the $Z_{bus}$ for a power system network.
• Able to find out the fault currents for all types faults with a view to provide data for the design of protective devices.
• Able to find out the sequence components of currents for any unbalanced power system network.

• Able to analyze the steady state, transient and dynamic stability concepts of a power system.

**Text Books:**

**Reference Books:**
Preamble:
This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors.

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

UNIT–I:
Fundamentals of Electric Drives

UNIT–II:
Three phase converter controlled DC motors
Revision of speed control techniques – Separately excited and series motors controlled by full converters – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Numerical problems – Four quadrant operation using dual converters.
UNIT–III:
Control of DC motors by DC–DC converters (Type C & Type D)
Single quadrant – Two quadrant and four quadrant chopper fed separately excited and series excited motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operations – Closed loop operation (Block diagrams only).

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

UNIT–V:
Control of Induction motor – Rotor side

UNIT–VI:
Control of Synchronous Motors
Separate control &self control of synchronous motors – Operation of self controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (Block Diagram Only) –Variable frequency control–Pulse width modulation.

Learning Outcomes:
Student should be able to

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

Text Books:

Reference Books:
1. Electric Motors and Drives Fundamentals, Types and Applications, by Austin Hughes and Bill Drury, Newnes.
3. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI.

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III Year – II SEMESTER

MANAGEMENT SCIENCE

UNIT I

UNIT II
Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart).
Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

UNIT IV
Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

UNIT V

UNIT VI
Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levies, Supply Chain Management,
Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, ‘Management Science’ Cengage, Delhi, 2012.

**References**


**Objective:**

To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/ Tables:**

Normal Distribution Function Tables need to be permitted into the examination Halls.
Learning objectives:

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single-phase and three-phase full-wave bridge converters, single-phase dual converter with both resistive and inductive loads.
- To understand the operation of AC voltage controller and cyclo converter with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter, single-phase bridge inverter and PWM inverter.

Any 10 of the Following Experiments are to be conducted

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR’s
3. Single -Phase Half controlled converter with R and RL load
4. Single -Phase fully controlled bridge converter with R and RL loads
5. Single -Phase AC Voltage Controller with R and RL Loads
6. Single -Phase Cyclo–converter with R and RL loads
7. Single -Phase Bridge Inverter with R and RL Loads
8. Single -Phase dual converter with RL loads
9. Three -Phase half controlled bridge converter with RL load.
10. Three- Phase full converter with RL–load.
11. DC–DC buck converter.
12. DC–DC boost converter.
15. Forced commutation circuits(Class A, Class B, Class C, Class D and Class E)
Learning outcomes:

- Able to study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- Able to analyze the performance of single-phase and three-phase full-wave bridge converters, single-phase dual converter with both resistive and inductive loads.
- Able to understand the operation of AC voltage controller and cyclo converter with resistive and inductive loads.
- Able to understand the working of Buck converter, Boost converter, single-phase bridge inverter and PWM inverter.
Learning Objectives:

- To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
- To understand measurement of illumination of electrical lamps.
- To understand testing of transformer oil.
- To measure the parameters of choke coil.

Any 10 of the following experiments are to be conducted

2. Calibration of dynamometer wattmeter using phantom loading UPF
8. Measurement of complex power with Trivector meter and verification.
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 AC. bridge.
21. Parameters of choke coil.

Learning Outcomes:

- To be able to measure accurately the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- To be able to measure illumination of electrical lamps.
- To be able to test transformer oil for its effectiveness.
- To be able to measure the parameters of inductive coil.
RENEWABLE ENERGY SOURCES AND SYSTEMS

Preamble:
This course gives a flavor of renewable sources and systems to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

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

UNIT–I:
Fundamentals of Energy Systems

UNIT–II:
Solar Thermal Systems
UNIT–III:
Solar Photovoltaic Systems
Balance of systems – IV characteristics – System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT–IV:
Wind Energy

UNIT–V:
Hydro and Tidal power systems
Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT–VI:
Biomass, fuel cells and geothermal systems
Fuel cell: Classification – Efficiency – VI characteristics.

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


Reference Books:

3. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
4. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
Preamble:
With the increasing power generation in the country and long distance power transmission, it is necessary that power should be transmitted at extra and ultra high voltage. The topics dealt in this subject relate to phenomena associated with transmission line at higher voltages, equipments generating high voltage and power control strategy.

Learning Objectives:
- To understand the phenomena associated with transmission line, operating at extra high voltages. The unit gives detail analysis of several phenomena viz. electrostatic field, charges, voltage gradient and conductor configuration.
- The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
- To understand the phenomena of HVDC, HVDC equipment comparison with AC and the latest state of art in HVDC transmission.
- To understand method of conversion of AC to DC, performance of various level of pulse conversion and control characteristics of conversion. It also provides knowledge of effect of source inductance as well as method of power control.
- To understand the requirements of reactive power control and filtering technique in HVDC system.
- To understand the harmonics in AC side of power line in a HVDC system and design of filters for various levels of pulse conversion.

UNIT – I:
Introduction of EHV AC transmission
Necessity of EHV AC transmission – Advantages and problems – Power handling capacity and line losses – Mechanical considerations – Resistance of conductors – Electrostatics – Field of sphere gap – Field of line charges and properties – Charge ~ potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius –
Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

UNIT – II:
Corona effects

UNIT – III:
Basic Concepts of DC Transmission

UNIT – IV:
Analysis of HVDC Converters and System Control

UNIT – V:
Reactive Power Control in HVDC

UNIT – VI:
Harmonics and Filters
Learning Outcomes:

- To be able to acquaint with HV transmission system with regard to power handling capacity, losses, conductor resistance and electrostatic field associate with HV. Further knowledge is gained in area of bundle conductor system to improve electrical and mechanical performance.
- To develop ability for determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines.
- To be able to acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system.
- To be able to develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.
- To develop knowledge of reactive power requirements of conventional control, filters and reactive power compensation in AC. side of HVDC system.
- Able to calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion.

Text Books:
3. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.

Reference Books:
2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
Preamble:
This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

Learning Objectives:

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

UNIT–I:

**Economic Operation of Power Systems**


UNIT–II:

**Hydrothermal Scheduling**

UNIT–III:
Unit Commitment

UNIT–IV:
Load Frequency Control

UNIT–V:
Load Frequency Controllers
Proportional plus Integral control of single area and its block diagram representation – Steady state response – Load Frequency Control and Economic dispatch control.

UNIT–VI:
Reactive Power Control

Learning Outcomes:
- Able to compute optimal scheduling of Generators.
- Able to understand hydrothermal scheduling.
- Understand the unit commitment problem.
- Able to understand importance of the frequency.
- Understand importance of PID controllers in single area and two area systems.
- Will understand reactive power control and line power compensation.
Text Books:
2. Power System stability & control, Prabha Kundur,TMH

Reference Books:
Preamble:
This is an open elective course developed to cater current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design, student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition, economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

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

Unit–I:
Basic Principles of Energy Audit and management

Unit–II:
Lighting
Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam

Unit–III:
Power Factor and energy instruments

Unit–IV:
Space Heating and Ventilation

Unit–V
Economic Aspects and Analysis

Unit–VI:
Computation of Economic Aspects

Learning Outcomes:
Student will be able to

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

Reference Books:

Note : This Elective can be offered to Students of All Branches including EEE.
INSTRUMENTATION
(Open Elective)

Preamble:
Electrical and Electronic Instrumentation plays a key role in the industry. With the advancement of technology day to day manual maintenance is replaced by simply monitoring using various instruments. Thus this course plays very important role in overall maintenance of the industry.

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

UNIT–I:
Signals and their representation

UNIT–II:
Transducers
UNIT–III:
Measurement of Non–Electrical Quantities

UNIT–IV:
Digital Voltmeters

UNIT–V:
Oscilloscope

UNIT–VI:
Signal Analyzers

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


Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier

2. Measurements Systems, Applications and Design – by D O Doeblin

3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson / Prentice Hall of India


4. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

Note : This Elective can be offered to Students of All Branches including EEE.
NON–CONVENTIONAL SOURCES OF ENERGY
(Open Elective)

Preamble:
This course gives a flavor of non–conventional sources of energy to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various non–conventional energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

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

UNIT–I:
Fundamentals of Energy Systems

UNIT–II:
Solar Thermal Systems

UNIT–III:
Solar Photovoltaic Systems
Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.
UNIT–IV:

Wind Energy

UNIT–V:

Hydro and Tidal power systems
Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT–VI:

Biomass, fuel cells and geothermal systems

Learning Outcomes:
Student should be able to

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

Text Books:

Reference Books:

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

Note: This Elective can be offered to Students of All Branches including EEE.

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Preamble:
Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

Learning Objectives:
1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

UNIT – I:
Introduction and Classical Optimization Techniques:

UNIT – II:
Classical Optimization Techniques
Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of
Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:
Linear Programming

UNIT – IV:
Transportation Problem
Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel’s approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

UNIT – V:
Nonlinear Programming:
**Unconstrained cases** - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell’s method and steepest descent method.

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

UNIT – VI:
Dynamic Programming:

Learning Outcomes:
The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.

3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.

4. Solve transportation and assignment problem by using Linear programming Simplex method.

5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.

6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

**Text Books:**


**Reference Books:**


2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co


4. Linear Programming–by G.Hadley.

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**Note:** This Elective can be offered to Students of All Branches except EEE.
Preamble:
In the recent times fabrication technology is revolutionized and especially LSI has become so dense that on a single IC tens and thousands of transistors are placed. Thus integrated circuits have become integrated systems and the development of fabrication technology VLSI plays very important role.

Learning Objectives:
- To provide the basic fundamentals of fabrication technology, generations of IC and speed, power consumptions of various fabrication technologies.
- To understand the knowledge of electrical properties of MOS circuits.
- To learn the design concepts of stick diagrams, layouts for various MOS technologies.
- To understand the concepts of design rules, scaling, subsystem design semiconductor IC design.
- To understand the synthesis, simulation design verification tools, CMOS testing.

UNIT –I
Introduction
Introduction to IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison b/w CMOS and bipolar technologies.

UNIT – II
Basic electrical properties of MOS and BiCMOS circuits
I_d–V_d relationships – Aspects of MOS transistor threshold voltage – MOS Trans–conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull–up to pull–down ratio for nMOS inverter driven by another nMOS inverter
for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

UNIT – III
MOS and BiCOMS circuit design processes

UNIT – IV
Basic circuit concepts

UNIT – V
Scaling of MOS circuit
Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density – Some architectural Issues – Introduction to switch logic and gate logic.

UNIT – VI
Digital design using HDL

VHDL MODELLING
– Major net list formats for design representation – VHDL synthesis – Programming approach.

Learning Outcomes

- Ability to demonstrate the fundamentals of IC technology such as various MOS fabrication technologies.
- Ability to calculate electrical properties of MOS circuits such as Ids – Vds relationship, Vt, gm, gds, figure of merit, sheet resistance, area capacitance.
- Ability to demonstrate semiconductor IC design such as PLA’s, PAL, FPGA, CPLS’s design.
- Ability to demonstrate VHDL synthesis, simulation, design capture tools design verification tools, CMOS testing.

Text Books:


References Books:

ELECTRICAL DISTRIBUTION SYSTEMS
(ELECTIVE–I)

Preamble:
This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

Learning Objectives
- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the determination of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation on p.f improvement.
- To study the effect of voltage control on distribution system.

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.

UNIT – II:
Substations
Location of substations: Rating of distribution substation – Service area within primary feeders – Benefits derived through optimal location of substations.

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 – III:
System Analysis
UNIT – IV:
Protection

Coordination
Coordination of protective devices: General coordination procedure – Residual current circuit breaker RCCB (Wikipedia).

UNIT – V:
Compensation for Power Factor Improvement

UNIT – VI:
Voltage Control

Learning Outcomes:
• Able to understand the various factors of distribution system.
• Able to design the substation and feeders.
• Able to determine the voltage drop and power loss
• Able to understand the protection and its coordination.
• Able to understand the effect of compensation on p.f improvement.
• Able to understand the effect of voltage, current distribution system performance.

Text Book:

Reference Books:
OPTIMIZATION TECHNIQUES
(Elective-I)

Preamble:
Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

Learning Objectives:
1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

UNIT – I:
Introduction and Classical Optimization Techniques:

UNIT – II:
Classical Optimization Techniques
Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of
Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:
Linear Programming

UNIT – IV:
Transportation Problem
Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel’s approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

UNIT – V:
Nonlinear Programming:
Unconstrained cases - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell’s method and steepest descent method.

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

UNIT – VI:
Dynamic Programming:

Learning Outcomes:
The student should be able to:
1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.

3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.

4. Solve transportation and assignment problem by using Linear programming Simplex method.

5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.

6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

Text Books:

Reference Books:
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
4. Linear Programming–by G. Hadley.

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IV Year – I SEMESTER

MICROPROCESSORS AND MICROCONTROLLERS LAB

Learning Objectives:

- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8056 microprocessor based ALP using arithmetic, logical and shift operations.
- To study modular and Dos/Bios programming using 8086 microprocessor.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 microcontroller.

Any 8 of the following experiments are to be conducted:

I. Microprocessor 8086:

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. 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.
6. Interfacing 8255–PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.
10. Interfacing 8279 – Keyboard Display.

Any 2 of the following experiments are to be conducted:

**Microcontroller 8051**

12. Reading and Writing on a parallel port.
13. Timer in different modes.
14. Serial communication implementation.
15. Understanding three memory areas of 00 – FF (Programs using above areas).
   Using external interrupts.

**Learning Outcomes:**

- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to do modular and Dos/Bios programming using 8086 micro processor.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 micro controllers.
Learning objectives:

- To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- To simulate transmission line by incorporating line, load and transformer models.
- To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- To find load flow solution for a transmission network with Newton–Rampson method.

Following experiments are to be conducted:

1. Simulation of transient response of RLC circuits
   a. Response to pulse input
   b. Response to step input
   c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current.
4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order.
6. Simulation of Boost and Buck converters.
8. Simulation of D.C separately excited motor using transfer function approach.

Any 2 of the following experiments are to be conducted:

1. Modeling of transformer and simulation of lossy transmission line.
2. Simulation of single phase inverter with PWM control.
3. Simulation of three phase full converter using MOSFET and IGBTs.
4. Transient analysis of single machine connected to infinite bus (SMIB).
Learning outcomes:

- Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- Able to simulate transmission line by incorporating line, load and transformer models.
- Able to perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- Able to find load flow solution for a transmission network with Newton–Rampson method.

Reference Books:

2. Pspice for circuits and electronics using PSPICE – by M.H.Rashid, M/s PHI Publications.
3. Pspice A/D user`s manual – Microsim, USA.
4. Pspice reference guide – Microsim, USA.
5. MATLAB user`s manual – Mathworks, USA.
6. MATLAB – control system tool box – Mathworks, USA.
7. SIMULINK user`s manual – Mathworks, USA.
Learning Objectives:
To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

Any 10 of the Following experiments are to be conducted:
1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission network.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8&9. Load flow studies any two methods.
10. Transient Stability Analysis
11. Load frequency control without control
12. Load frequency control with control
13. Economic load dispatch without losses

Learning Outcomes:
The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch centre.
Preamble:
In recent years digital controllers have become popular due to their capability of accurately performing complex computations at high speeds and versatility in leading non linear control systems. In this context, this course focuses on the analysis and design of digital control systems.

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

UNIT – I:
Introduction and signal processing
Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:
Z–transformations

UNIT–III:
State space analysis and the concepts of Controllability and observability
State Space Representation of discrete time systems – State transition matrix and

UNIT – IV:
Stability analysis

UNIT – V:
Design of discrete–time control systems by conventional methods
Transient and steady state specifications – Design using frequency response in the w–plane for lag and led compensators – Root locus technique in the z–plane.

UNIT – VI:
State feedback controllers:
Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman’s formula.

Learning outcomes:
- The students learn the advantages of discrete time control systems and the “know how” of various associated accessories.
- The learner understand z–transformations and their role in the mathematical analysis of different systems(like laplace transforms in analog systems).
- The stability criterion for digital systems and methods adopted for testing the same are explained.
- Finally, the conventional and state–space methods of design are also introduced.

Text Book:

Reference Books:
2. Digital Control and State Variable Methods by M.Gopal, TMH
ADVANCED CONTROL SYSTEMS

Preamble:
This subject aims to study state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Learning Objectives:
- Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lyapnov’s method of stability analysis of a system.
- Formulation of Euler Laugrange equation for the optimization of typical functionals and solutions.
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccati equation.

UNIT – I:
State space analysis
State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

UNIT – II:
Controllability, observability and design of pole placement
UNIT – III:
Describing function analysis
Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

UNIT–IV:
Stability analysis
Stability in the sense of Lyapunov – Lyapunov’s stability and Lypanov’s instability theorems – Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.

UNIT–V:
Calculus of variations

UNIT –VI:
Optimal control
Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) - Optimal controller design using LQG framework.

Learning Outcomes:
- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lyapnov method.
- Minimization of functionals using calculus of variation studied.
- Able to formulate andslove the LQR problem and riccatti equation.

Text Books:
- Automatic Control Systems by B.C. Kuo, Prentice Hall Publication
**Reference Books:**

5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

***
HIGH VOLTAGE ENGINEERING
(ELECTIVE – II)

Preamble:
With the growth of power, HV power transmission has become an important subject. The performance of generating equipment requires knowledge of different phenomena occurring at higher voltage. Thus evaluations of various insulating materials are required for protection of HV equipments. Keeping this in view the course is designed to understand various phenomena related to breakdown study and withstand characteristics of insulating materials. The course also describes the generation and measurement of DC, AC and Impulse voltages as well various testing techniques.

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

UNIT–I:
Introduction to High Voltage Technology
Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II:
Breakdown phenomenon in gaseous, liquid and solid insulation
UNIT–III:
Generation of High voltages and High currents
Generation of high DC voltages – Generation of high alternating voltages –
Generation of impulse voltages – Generation of impulse currents – Tripping
and control of impulse generators.

UNIT–IV:
Measurement of high voltages and High currents
Measurement of high AC, DC and Impulse voltages – Voltages and
measurement of high currents – Direct, alternating and Impulse.

UNIT–V:
Non–destructive testing of material and electrical apparatus
Measurement of DC resistivity – Measurement of dielectric constant and loss
factor – Partial discharge measurements.

UNIT–VI:
High voltage testing of electrical apparatus
Testing of insulators and bushings – Testing of isolators and circuit breakers
Radio interference measurements.

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

Text Books:
1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH


Reference Books:


SPECIAL ELECTRICAL MACHINES
(Elective – II)

Preamble:
This is an advanced course on electrical machines. Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors, linear motors and electric motors for traction drives.

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

UNIT I:
Switched Reluctance Motor
Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

UNIT II:
Stepper Motors

UNIT III:
Permanent Magnet DC Motors
Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.
UNIT IV:
Permanent Magnet Brushless DC Motor

UNIT V:
Linear motors

UNIT VI:
Electric Motors for traction drives
AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Learning Outcomes:
The student should be able to
- Explain theory of operation and control of switched reluctance motor.
- Explain the performance and control of stepper motors, and their applications.
- Describe the operation and characteristics of permanent magnet dc motor.
- Distinguish between brush dc motor and brush less dc motor.
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

Text Books:
ELECTRICAL ENGINEERING

IV Year – II SEMESTER

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ELECTIVE – III

ELECTRIC POWER QUALITY

Preamble:
Power quality is a major problem for utilities and customers. Customers using sensitive critical loads need quality power for proper operation of the electrical equipment. It is important for the student to learn the power quality issues and improvement measures provided by the utility companies. This course covers the topics on voltage and current imperfections, harmonics, voltage regulation, power factor improvement, distributed generation, power quality monitoring and measurement equipment.

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

UNIT–I:
Introduction

UNIT–II:
Voltage imperfections in power systems
Power quality terms – Voltage sags – Voltage swells and interruptions –

UNIT–III
Voltage Regulation and power factor improvement:

UNIT–IV
Harmonic distortion and solutions

UNIT–V
Distributed Generation and Power Quality

UNIT–VI
Monitoring and Instrumentation

Learning Outcomes:
At the end of this course the student should be able to
- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.
• Explain the principle of voltage regulation and power factor improvement methods.
• Demonstrate the relationship between distributed generation and power quality.
• Explain the power quality monitoring concepts and the usage of measuring instruments.

Textbooks:

Reference Books:
DIGITAL SIGNAL PROCESSING
(Elective – III)

Preamble:
Signals analysis is very important in daily life. Hence it is required to study the different signals (continuous and discrete) and their properties. The behavior of the signals in time and frequency domain are important in analyzing the response of the network. The tools like FFT, DFT, Z–transforms may be used in the analysis of the signals. Filters must be required to eliminate the unwanted signals. Hence digital filter design also required to be studied. Sampling of signals are required to convert continuous to discrete signals. To have knowledge on the implementation signals, DSP processors must be studied.

Learning Objectives:
- To study different types of signals and properties of systems.
- To study the application of Fourier transform to discrete time systems.
- To study the FFT and inverse FFT and its applications to discrete sequences.
- To study the realization of digital filters and their design.
- To study the multi–rate signal processing.
- To study the architecture of digital signal processors.

UNIT–I:
Introduction
Introduction to Digital Signal Processing: Discrete time signals & sequences – Linear shift invariant systems – Stability and causality – Linear constant coefficient difference equations.

UNIT–II:
Discrete Fourier Series

UNIT–III:
Fast Fourier Transforms
Frequency domain representation of discrete time signals and systems – Fast
Fourier transforms (FFT) – Radix–2 decimation in time and decimation in frequency FFT Algorithms – Inverse FFT – and FFT for composite N.

UNIT–IV:
Realization of Digital Filters
Solution of difference equations of digital filters – Block diagram representation of linear constant – Coefficient difference equations – Basic structures of IIR systems – Transposed forms – Basic structures of FIR systems – System function.

IIR Digital Filters

FIR Digital Filters

UNIT–V:
Multirate Digital Signal Processing:

UNIT–VI:
Introduction to Digital Signal Processors(DSP):

Learning outcomes:

• Able to study different types of signals and properties of systems.
• Able to apply of Fourier transform to discrete time systems.
• Able to apply the FFT and inverse FFT to discrete sequences.
- Able to realize and design digital filters.
- Able to understand the multi-rate signal processing.
- Able to understand architecture of digital signal processors.

**Text Books:**

**Reference Books:**
FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (FACTS)
(Elective – III)

Preamble:
Flexible Alternating Current Transmission System controllers have become a part of modern power system. It is important for the student to understand the principle of operation of series and shunt compensators by using power electronics. As the heart of many power electronic controllers is a voltage source converter (VSC), the student should be acquainted with the operation and control of VSC. Two modern power electronic controllers are also introduced.

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

UNIT–I:
Introduction to FACTS

UNIT–II:
Voltage source and Current source converters
converter – Comparison of current source converter with voltage source converter.

UNIT–III:
Shunt Compensators–1
Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping.

Methods of controllable VAR generation
Variable impedance type static VAR generators – Thyristor Controlled Reactor (TCR) and Thyristor Switched Reactor (TSR).

UNIT–IV:
Shunt Compensators–2
Thyristor Switched Capacitor(TSC)– Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

UNIT V:
Series Compensators
Static series compensators: Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

UNIT–VI:
Combined Controllers
Schematic and basic operating principles of unified power flow controller(UPFC) and Interline power flow controller(IPFC) – Application of these controllers on transmission lines.

Learning Outcomes:
The student should be able to
- Determine power flow control in transmission lines by using FACTS controllers.
- Explain operation and control of voltage source converter.
• Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.

• Explain the method of shunt compensation by using static VAR compensators.

• Appreciate the methods of compensations by using series compensators.

• Explain the operation of modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

Text Books:


2. “Flexible ac transmission system (FACTS)” Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.

Preamble:
This course teaches students how to develop Java applications. Topics covered include the Java programming language syntax, OO programming using Java, exception handling, file input/output, threads, collection classes, and networking.

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

UNIT I:
Introduction to OOP
Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II:
Programming Constructs
Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules
and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.

**Classes and Objects**- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

**UNIT III:**

**Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

**Interfaces, Packages and Enumeration:** Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package.

**Exceptions & Assertions** - Introduction, Exception handling techniques-try... catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

**UNIT IV:**

**MultiThreading:** java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Synchronization, suspending and Resuming threads, Communication between Threads

**Input/Output:** reading and writing data, java.io package

**UNIT V:**

**Applets**- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint (), update () and repaint ()

**Event Handling** -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.

**UNIT VI:**

**Abstract Window Toolkit**

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

**Swing**:

Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.
Learning Outcomes:

- Understand the format and use of objects.
- Understand basic input/output methods and their use.
- Understand object inheritance and its use.
- Understand development of JAVA applets vs. JAVA applications.
- Understand the use of various system libraries.

Text Books:
1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.
5. Introduction to Java programming, 7th ed, Y Daniel Liang, Pearson.

Reference Books:
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
UNIX AND SHELL PROGRAMMING
(Elective – IV)

Learning Objectives:
- to provide a comprehensive introduction to Shell Programming.
- have the fundamental skills required to write simple and complex Shell scripts to automate jobs and processes in the Unix environment.

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 utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, umask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text processing utilities and backup utilities, 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:
Grep : Operation, grep Family, Searching for File Content.
Sed : Scripts, Operation, Addresses, commands, Applications, grep and sed.

**UNIT V :**

**Interactive Korn Shell:** Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

**Korn Shell Programming:** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**UNIT VI :**

**Interactive C Shell:** C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.

**C Shell Programming:** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**Learning Outcomes:**

Upon completing this course students will have skills in:

1. Use UNIX shells and commands to create powerful data processing applications.
2. Build UNIX applications using the shell command interpreter and UNIX commands.
3. Use UNIX at the command line to manage data, files, and programs.
4. Use UNIX editors and tools to create and modify data files and documents.

**Text Books :**


References Books:

1. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.

2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education.

AI TECHNIQUES
(Elective IV)

Preamble:
The aim of this course is to study the AI techniques such as neural networks and fuzzy systems. The course focuses on the application of AI techniques to electrical engineering.

Learning Objectives:
• To study various methods of AI
• To study the models and architecture of artificial neural networks.
• To study the ANN paradigms.
• To study the fuzzy sets and operations.
• To study the fuzzy logic systems.
• To study the applications of AI.

UNIT–I:
Introduction to AI techniques

UNIT–II:
Neural Networks

UNIT–III:
ANN paradigm
Multi-layer feed-forward network (based on Back propagation algorithm)– Radial-basisn function networks- Recurrent networks (Hopfield networks).

UNIT – IV:
Classical and Fuzzy Sets
UNIT–V:
Fuzzy Logic System Components
Fuzzification – Membership value assignment – Development of rule base and decision making system – Defuzzification to crisp sets – Defuzzification methods – Basic hybrid system.

UNIT–VI:
Application of AI techniques
Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Reactive power control – Speed control of dc and ac motors.

Text Books:
2. Fuzzy logic with fuzzy applications- by T.J. Ross, TMH.

Reference Books:
4. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa TMGH
PREAMBLE:
This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment.

LEARNING OBJECTIVES:
• To study fundamentals of power system deregulation and restructuring.
• To study available transfer capability.
• To study congestion management
• To study various electricity pricing.
• To study operation of power system in deregulated environment.
• To study importance of Ancillary services management.

UNIT–I
OVER VIEW OF KEY ISSUES IN ELECTRIC UTILITIES

UNIT–II
OASIS: OPEN ACCESS SAME–TIME INFORMATION SYSTEM

UNIT–III
CONGESTION MANAGEMENT
Introduction to congestion management – Methods to relieve congestion

UNIT–IV
ELECTRICITY PRICING:
Introduction – Electricity price volatility electricity price indexes –
Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

UNIT–V

**Power system operation in competitive environment:**

UNIT–VI

**Ancillary Services Management:**
Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

**Learning Outcomes:**

- Will understand importance of power system deregulation and restructuring.
- Able to compute ATC.
- Will understand transmission congestion management.
- Able to compute electricity pricing in deregulated environment.
- Will be able to understand power system operation in deregulated environment.
- Will understand importance of ancillary services.

**Text Books:**

4. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH.
SYSTEMS ENGINEERING  
(Elective IV)

Preamble:
This course is intended to introduce the student to the systems engineering process used to create multidisciplinary solutions to complex problems which have multiple, often conflicting objectives. The course will provide an overview of systems engineering in the context of large developmental programs. By focusing on the objectives, principles and practices of systems engineering, the course will enable the student to better understand the functions, capabilities and limitations of systems engineering.

Learning Objectives:
- To understand the foundations of systems Engineering.
- To understand the process of engineering systems systematically
- To understand how to deploy (put to use) the systems engineered.
- To understand the supporting systems during systems life cycle.
- To understand the application of systems engineering in product and service space.
- To understand systems engineering in perspective of related disciplines project management and software engineering.

UNIT–I:

UNIT –II:

UNIT – III:

UNIT – IV:
Systems engineering management – Planning – Assessment and Control –

UNIT – V:
Applications of systems engineering – Product systems engineering – Services Systems engineering – Enterprise systems engineering

UNIT – VI:
Enabling systems engineering – People: Enabling teams and individuals – Software engineering, Project management – Case studies.

Learning Outcomes:
- To be able to appreciate and evaluate systems in general and apply to specific systems.
- Should engineer successful systems fit for intended purpose. Right from concept to development.
- Should be able to successfully deploy the new systems developed.
- Should be able to leverage the support systems for success of systems from womb to tomb.
- Should be able to apply systems engineering in engineering product and services.
- Should be able to relate systems engineering with project management and software engineering.

Text books:
1. SEBOK Guide to the Systems Engineering Body of Knowledge (SEBoK), version 1.2 – INCOSE

Reference Books:

IV Year – II SEMESTER

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Project

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ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

MECHANICAL ENGINEERING

For

B.Tech., FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2013-14)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533003, ANDHRA PRADESH, INDIA.
Academic Regulations (R13) for B. Tech. (Regular)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 onwards

1. **Award of B. Tech. Degree**
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
   
   1. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
   2. The candidate shall register for 180 credits and secure all the 180 credits.

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

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<td>Electronics and Communication Engineering</td>
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<td>Electrical and Electronics Engineering</td>
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<td>Electronics and Instrumentation Engineering</td>
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<td>Electronics and Computer Engineering</td>
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<td>Mining Engineering</td>
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<tr>
<td>16</td>
<td>Petroleum Engineering</td>
</tr>
<tr>
<td>17</td>
<td>Metallurgical Engineering</td>
</tr>
<tr>
<td>18</td>
<td>Agricultural Engineering</td>
</tr>
</tbody>
</table>
3. Distribution and Weightage of Marks

(i) The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

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

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain 3 questions and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.
(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. 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 conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**
   1. A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
   2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee
   3. Shortage of Attendance below 65% in aggregate shall not be condoned.
   4. A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.
   5. Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
6. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) credits.

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

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

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

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

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement of **40% of the credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**

5.4 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

6. **Course pattern**

1. The entire course of study is for four academic years, all the years are on semester pattern.

2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continues to be applicable to him.

7. **Award of Class**

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 180 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70 but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

8. **Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

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

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.
12. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.

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

13. **General**

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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

3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

4. The University 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 University.

5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

* * * *
Academic Regulations (R13) for B. Tech.  
(Lateral entry Scheme)  

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

1. **Award of B. Tech. Degree**  
   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:  
   1.1 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.  
   1.2 The candidate shall register for 132 credits and secure all the 132 credits.

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

3. **Promotion Rule**  
   A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.  
   A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured from 132 Credits from II year to IV year</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Disciplinary Action for / Improper Conduct in Examinations**

<table>
<thead>
<tr>
<th>Nature of Malpractices / Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the candidate:</td>
<td></td>
</tr>
<tr>
<td><strong>1.</strong></td>
<td></td>
</tr>
<tr>
<td>(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td></td>
</tr>
<tr>
<td>Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td></td>
</tr>
<tr>
<td>Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the</td>
</tr>
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</tr>
<tr>
<td>4.</td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td>5.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
</tbody>
</table>
| 6. | Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Consequence</td>
</tr>
<tr>
<td>-----</td>
<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>
<td>Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
</tr>
<tr>
<td>12.</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.</td>
<td></td>
</tr>
</tbody>
</table>

**Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *
Ragging
Prohibition of ragging in educational institutions Act 26 of 1997

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Imprisonment upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing &amp; Humiliation</td>
<td>6 Months</td>
<td>+ Rs. 1,000/-</td>
</tr>
<tr>
<td>Assaulting or Using Criminal force or Criminal intimidation</td>
<td>1 Year</td>
<td>+ Rs. 2,000/-</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>2 Years</td>
<td>+ Rs. 5,000/-</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence</td>
<td>5 Years</td>
<td>+ Rs. 10,000/-</td>
</tr>
<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</td>
<td>+ Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

ABSOLUTELY
NOT TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded.
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY
## COURSE STRUCTURE

### I Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – I</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics - I</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Chemistry</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Mechanics</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Computer Programming</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Environmental Studies</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Engineering Chemistry Laboratory</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>English - Communication Skills Lab - I</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>C Programming Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits**: 24

### I Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>English – II</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics – II (Mathematical Methods)</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics – III</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Engineering Physics</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Professional Ethics and Human Values</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Engineering Drawing</td>
<td>3+1</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>English - Communication Skills Lab - II</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Engineering Physics Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Engineering Physics – Virtual Labs - Assignments</td>
<td>--</td>
<td>2</td>
<td>--</td>
</tr>
<tr>
<td>10</td>
<td>Engg.Workshop &amp; IT Workshop</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits**: 24

### II Year – I SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metallurgy &amp; Materials Science</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Mechanics of Solids</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>S. No.</td>
<td>Subject</td>
<td>T</td>
<td>P</td>
<td>Credits</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>3</td>
<td>Thermodynamics</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Managerial Economics &amp; Financial Analysis</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Basic Electrical &amp; Electronics Engineering</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Computer aided Engineering Drawing Practice</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Basic Electrical &amp; Electronics Engg. Lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Mechanics of Solids &amp; Metallurgy lab</td>
<td>--</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>

### II Year – II SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kinematics of Machinery</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Thermal Engineering -I</td>
<td>3+1*</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Production Technology</td>
<td>3+1*</td>
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<tr>
<td>4</td>
<td>Fluid Mechanics &amp; Hydraulic machinery</td>
<td>3+1*</td>
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<td>5</td>
<td>Machine Drawing</td>
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<tr>
<td>6</td>
<td>Fluid mechanics &amp; Hydraulic machinery Lab</td>
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<td>3</td>
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<td>7</td>
<td>Production Technology Lab</td>
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<td>8</td>
<td>Thermal Engineering Lab</td>
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### III Year – I SEMESTER

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<tr>
<th>S. No.</th>
<th>Subject</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>Dynamics of Machinery</td>
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<tr>
<td>2</td>
<td>Metal Cutting &amp; Machine Tools</td>
<td>3+1*</td>
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<tr>
<td>3</td>
<td>Design of Machine Members–I</td>
<td>3+1*</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Instrumentation &amp; Control Systems</td>
<td>3+1*</td>
<td></td>
<td>3</td>
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<td>5</td>
<td>Thermal Engineering -II</td>
<td>3+1*</td>
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<tr>
<td>6</td>
<td>Metrology</td>
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<td>7</td>
<td>Metrology &amp; Instrumentation Lab</td>
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<td>8</td>
<td>Machine Tools Lab</td>
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<td>9</td>
<td>IPR &amp; Patents</td>
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### III Year – II SEMESTER

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<th>Credits</th>
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<tr>
<td>1</td>
<td>Operations Research</td>
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<tr>
<td>2</td>
<td>Interactive Computer Graphics</td>
<td>3+1*</td>
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<tr>
<td>3</td>
<td>Design of Machine Members– II</td>
<td>3+1*</td>
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<td>3</td>
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<tr>
<td>4</td>
<td>Robotics</td>
<td>3+1*</td>
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<td>5</td>
<td>Heat Transfer</td>
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<td>6</td>
<td>Industrial Engineering Management</td>
<td>3+1*</td>
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<td><strong>Departmental Elective – I</strong></td>
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<td>8</td>
<td>Heat Transfer Lab</td>
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**Total Credits**: 23

### IV Year – I SEMESTER

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<th>Credits</th>
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<tbody>
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<td>1</td>
<td>Automobile Engineering</td>
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<td>2</td>
<td>CAD/CAM</td>
<td>3+1*</td>
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<td>Finite Element Methods</td>
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<td>4</td>
<td>Unconventional Machining Processes</td>
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<td>7</td>
<td>Simulation Lab</td>
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<td>8</td>
<td>Design/Fabrication Project</td>
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**Total Credits**: 21

### IV Year – II SEMESTER

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<th>Subject</th>
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<tr>
<td>1</td>
<td>Production Planning and Control</td>
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<td>2</td>
<td>Green Engineering Systems</td>
<td>3+1*</td>
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<td><strong>Departmental Elective – III</strong></td>
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<tr>
<td>4</td>
<td><strong>Departmental Elective – IV</strong></td>
<td>3+1*</td>
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<tr>
<td>5</td>
<td>Project Work</td>
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<td>9</td>
</tr>
</tbody>
</table>

**Total Credits**: 21

**OPEN ELECTIVE:**
1. MEMS
2. Nanotechnology
Departmental Elective -I:
1. Refrigeration & Air-conditioning
2. Computational Fluid Dynamics
3. Condition Monitoring
4. Rapid Prototyping

Departmental Elective -II:
1. Material Characterization Techniques
2. Design for Manufacture
3. Automation in Manufacturing
4. Industrial Hydraulics & Pneumatics

Departmental Elective -III:
1. Experimental Stress Analysis
2. Mechatronics
3. Advanced Materials
4. Power Plant Engineering

Departmental Elective -IV:
1. Non Destructive Evaluation
2. Advanced Optimization Techniques
3. Gas Dynamics & Jet Propulsion
4. Quality and Reliability Engineering
SYLLABUS

I Year – I SEMESTER

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</table>

ENGLISH –I
(Common to All Branches)

DETAILED TEXT-I English Essentials: Recommended Topics:

1. **IN LONDON: M.K.GANDHI**
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME:** The learner will understand how Gandhi grew in introspection and maturity.

2. **THE KNOWLEDGE SOCIETY- APJ KALAM**
   **OBJECTIVE:** To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**
   **OBJECTIVE:** This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. **PRINCIPLES OF GOOD WRITING:**
   **OBJECTIVE:** To inform the learners how to write clearly and logically.
   **OUTCOME:** The learner will be able to think clearly and logically and write clearly and logically.

5. **MAN’S PERIL**
   **OBJECTIVE:** To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. **THE DYING SUN—SIR JAMES JEANS**
   **OBJECTIVE:** This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   **OUTCOME:** This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.
7. **LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man’s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME:** The story is humorous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book:** ‘English Essentials’ by Ravindra Publications

**NON-DETAILED TEXT:**

(From Modern Trailblazers of Orient Blackswan)  
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. **G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu’s example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. **G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. **Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. **Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book:** ‘Trail Blazers’ by Orient Black Swan Pvt. Ltd. Publishers
I Year – I SEMESTER

MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.
Applications : Newton’s Law of cooling-Law of natural growth and decay-
orthogonal trajectories.
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with
RHS term of the type e \(^{ax}\), Sin ax, cos ax, polynomials in x, e \(^{ax}\) V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of
derivatives and integrals – Unit step function –Dirac’s delta function- Inverse
Laplace transforms– Convolution theorem (with out proof).
Application: Solutions of ordinary differential equations using Laplace
transforms.
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV 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.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

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

UNIT VI Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients-Method of separation of Variables.
Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Books:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
<td></td>
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<tr>
<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Algorithms</td>
<td></td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
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<tr>
<td>Drawing</td>
<td></td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
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<tr>
<td>Others</td>
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<td>6. Problem based</td>
<td>F. Application s related questions</td>
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<td>7. Experimental (project based) based</td>
<td>G. Brain storming questions</td>
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<td>8. Lab work or field work based</td>
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<td>9. Presentation based</td>
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<td>10. Case Studies based</td>
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<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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</table>
UNIT-I: WATER TECHNOLOGY
Hard Water – Estimation of hardness by EDTA method – Potable water-
Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming
and foaming , scale formation, corrosion, caustic embrittlement, turbine
deposits – Softening of water – Lime soda, Zeolite processes – Reverse
osmosis – Electro Dialysis, Ion exchange process.
Objectives : For prospective engineers knowledge about water used in
industries (boilers etc.) and for drinking purposes is useful; hence chemistry
of hard water, boiler troubles and modern methods of softening hard water is
introduced.

UNIT-II : ELECTROCHEMISTRY
Concept of Ionic conductance – Ionic Mobilities – Applications of
Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode
potentials – Nernst equation – Electrochemical series – Potentiometric
titrations – Concentration cells – Ion selective electrode – Glass electrodes –
Fluoride electrode; Batteries and Fuel cells.
Objectives : Knowledge of galvanic cells, electrode potentials, concentration
cells is necessary for engineers to understand corrosion problem and its
control ; also this knowledge helps in understanding modern bio-sensors, fuel
cells and improve them.

UNIT-III : CORROSION
Causes and effects of corrosion – theories of corrosion (dry, chemical and
electrochemical corrosion) – Factors affecting corrosion – Corrosion control
methods – Cathodic protection – Sacrificial Anodic, Impressed current
methods – Surface coatings – Methods of application on metals (Hot dipping,
Galvanizing, tinning , Cladding, Electroplating, Electroless plating) –
Organic surface coatings – Paints – Their constituents and their functions.
Objectives : the problems associated with corrosion are well known and the
engineers must be aware of these problems and also how to counter them.

UNIT-IV : HIGH POLYMERS
Types of Polymerization – Stereo regular Polymers – Physical and
Mechanical properties of polymers – Plastics – Thermoplastics and thermo
setting plastics – Compounding and Fabrication of plastics – Preparation and

Objectives: Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V: FUELS

Objectives: A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI: CHEMISTRY OF ADVANCED MATERIALS

Objectives: With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

TEXT BOOKSS

REFERENCES

Objectives:
The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work-energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.


UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.


UNIT – III
Objectives: The students are to be exposed to concepts of centre of gravity.

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.
UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion


TEXT BOOKS:

REFERENCES:


Objectives: Formulating algorithmic solutions to problems and implementing algorithms in C.

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts.
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
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 for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: 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 multi-dimensional arrays, dynamic memory management functions, command line arguments.

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON.
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan

Reference Books and web links:
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge
Course Learning Objectives:
The objectives of the course is to impart.
1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

Course Outcomes:
The student should have knowledge on
1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:

UNIT - I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains,
Mechanical Engineering

ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems
Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.
Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.

**Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.
Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - V

UNIT - VI
The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi

Reference:
List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na₂CO₃ solutions
3. Estimation of KMnO₄ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K₂Cr₂O₇ solution.
5. Estimation of Copper using standard K₂Cr₂O₇ solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKS

Suggested Lab Manuals:

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

**UNIT 1**  
A. Greeting and Introductions  
B. Pure Vowels

**UNIT 2**  
A. Asking for information and Requests  
B. Diphthongs

**UNIT 3**  
A. Invitations  
B. Consonants

**UNIT 4**  
A. Commands and Instructions  
B. Accent and Rhythm

**UNIT 5**  
A. Suggestions and Opinions  
B. Intonation

**Text Book:**  
‘Strengthen your Communication Skills’ Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications).
Exercise 1
a) Write a C Program to calculate the area of triangle using the formula
   \[\text{area} = \sqrt{s(s-a)(s-b)(s-c)}\] where \(s = \frac{(a+b+c)}{2}\)

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2
a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.

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

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

Exercise 3
a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4
a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

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

c) Write a C Program to check whether the given number is Armstrong number or not.
Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a linear search.
c) Write a C program to implement binary search

Exercise 6
a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

Exercise 7
Write a C program that uses functions to perform the following operations:
i. To insert a sub-string in to given main string from a given position.
ii. To delete n Characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:
i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions
- to concatenate two strings
- to append a string to another string
- to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions
- to find the length of a string
- to find whether a given string is palindrome or not

Exercise 11
a) Write a C functions to find both the largest and smallest number of an array of integers.
b) Write C programs illustrating call by value and call by reference concepts.
Exercise 12
Write C programs that use both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To find Fibonacci sequence

Exercise 13
a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers

Exercise 14
a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.
b) Write a C program to swap two numbers using pointers

Exercise 15
Examples which explores the use of structures, union and other user defined variables

Exercise 16
a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.
DETAILED TEXT-II : Sure Outcomes: English for Engineers and Technologists Recommended Topics:

1. TECHNOLOGY WITH A HUMAN FACE
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME:** The proposed technology is people’s technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
   **OBJECTIVE:** To make the learner understand how the unequal heating of earth’s surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME:** The learner’s understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
   **OBJECTIVE:** To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME:** The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
   **OBJECTIVE:** To inform the learner of the various advantages and characteristics of water.
   **OUTCOME:** The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
   **OBJECTIVE:** In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME:** The students will learn to work hard with devotion and dedication.

6. WORK BRINGS SOLACE
   **OBJECTIVE:** In this lesson Abdul Kalam highlights the advantage of work.
   **OUTCOME:** The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. J.C. Bose
   OBJECTIVE: To apprise of J.C.Bose’s original contributions.
   OUTCOME: The learner will be inspired by Bose’s achievements so that he may start his own original work.

2. Homi Jehangir Bhaba
   OBJECTIVE: To show Bhabha as the originator of nuclear experiments in India.
   OUTCOME: The learner will be inspired by Bhabha’s achievements so as to make his own experiments.

3. Vikram Sarabhai
   OBJECTIVE: To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   OUTCOME: The learner will realize that development is impossible without scientific research.

   OBJECTIVE: To expose the reader to the pleasure of the humorous story
   OUTCOME: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

I Year – II SEMESTER

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:
Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equestions)
Subject Category
ABET Learning Objectives  a e k
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT II Interpolation:
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT III Numerical solution of Ordinary Differential equations:
Subject Category
ABET Learning Objectives  a e
ABET internal assessments  1 2 4 6
JNTUK External Evaluation  A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series.
Application: Amplitude, spectrum of a periodic function
Subject Category
ABET Learning Objectives  a e d
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT V Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms
Subject Category
ABET Learning Objectives  a d e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

UNIT VI Z-transform:
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.
Subject Category
ABET Learning Objectives  a b e k
ABET internal assessments  1 2 6
JNTUK External Evaluation  A B E

BOOKS:
<table>
<thead>
<tr>
<th>Subject Category</th>
<th>ABET Learning Objectives</th>
<th>ABET Internal Assessments</th>
<th>JNTUK External Evaluation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>a) Apply knowledge of math, science, &amp; engineering</td>
<td>1. Objective tests</td>
<td>A. Questions should have:</td>
<td></td>
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<tr>
<td>Design</td>
<td>b) Design &amp; conduct experiments, analyze &amp; interpret data</td>
<td>2. Essay questions tests</td>
<td>B. Definitions, Principle of operation or philosophy of concept.</td>
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<tr>
<td>Analysis</td>
<td>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</td>
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<tr>
<td>Algorithms</td>
<td>d) Function on multidisciplinary teams</td>
<td>4. Simulation based</td>
<td>D. Design oriented problems</td>
<td></td>
</tr>
<tr>
<td>Drawing</td>
<td>e) Identify, formulate, &amp; solve engineering problems</td>
<td>5. Design oriented</td>
<td>E. Trouble shooting type of questions</td>
<td></td>
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<tr>
<td>Others</td>
<td>f) Understand professional &amp; ethical responsibilities</td>
<td>6. Problem based</td>
<td>F. Application related questions</td>
<td></td>
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<td></td>
<td>g) Communicate effectively</td>
<td>7. Experiential (project based) based</td>
<td>G. Brainstorming questions</td>
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<td></td>
<td>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</td>
<td>8. Lab work or field work based</td>
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<td>i) Recognize need for &amp; be able to engage in lifelong learning</td>
<td>9. Presentation based</td>
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<td>j) Know contemporary issues</td>
<td>10. Case Studies based</td>
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<td>k) Use techniques, skills, modern tools for engineering practices</td>
<td>11. Role-play based</td>
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<td>12. Portfolio based</td>
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I Year – II SEMESTER

MATHEMATICS – III
(LINEAR ALGEBRA & VECTOR CALCULUS)
(Common to All Branches)

UNIT I Linear systems of equations:
Application: Finding the current in an electrical circuit.
Subject Category
ABET Learning Objectives   a e k
ABET internal assessments   1 2 6 4
JNTUK External Evaluation   A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Application: Free vibration of a two-mass system.
Subject Category
ABET Learning Objectives   a d e k
ABET internal assessments   1 2 4 6
JNTUK External Evaluation   A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- 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
Application: Moments of inertia
Subject Category
ABET Learning Objectives   a e d
ABET internal assessments   1 2 6
JNTUK External Evaluation   A B E
UNIT IV Special functions:
Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of improper integrals.
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient - Divergence - Curl - Laplacian and second order operators - Vector identities.
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Vector Integration:
Application: work done, Force
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

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<td>Theory Design</td>
<td>a) Apply knowledge of</td>
<td>1. Objective tests</td>
<td>A. Questions should</td>
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<tr>
<td>Analysis</td>
<td>math, science, &amp;</td>
<td>2. Essay questions tests</td>
<td>have:</td>
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<td>Algorithms</td>
<td>engineering</td>
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<td>B. Definition</td>
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<td>Drawing</td>
<td>b) Design &amp; conduct</td>
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<td>of operation or</td>
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<td>Others</td>
<td>experiments, analyze &amp;</td>
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<td>philosophy of</td>
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<td>interpret data</td>
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<td>c) Design a system/process to meet</td>
<td>3. Peer tutoring based</td>
<td>C. Mathematical</td>
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<td>desired needs within</td>
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<td>treatment, derivation</td>
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<td>political, ethical,</td>
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<td>manufacturability, &amp;</td>
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<td>D. Design oriented</td>
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<td>E. Trouble shooting</td>
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<td>d) Function on</td>
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<td>multidisciplinary teams</td>
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<td>F. Applications</td>
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<td>e) Identify, formulate,</td>
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<td>related questions</td>
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<td>&amp; solve engineering</td>
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<td>G. Brain storming</td>
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<td>f) Understand</td>
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<td>g) Communicate</td>
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<td>h) Understand</td>
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<td>impact of engineering</td>
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<td>solutions in global,</td>
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<td>be able to engage in</td>
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<td>lifelong learning</td>
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<td>j) Know contemporary</td>
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<td>k) Use techniques, skills,</td>
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<td>modern tools for</td>
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<td>engineering practices</td>
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UNIT-I

PHYSICAL OPTICS FOR INSTRUMENTS

“Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics”


UNIT-II

COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.


X-RAY DIFFRACTION TECHNIQUES : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg’s law.
UNIT-III
MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

“Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve


SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London’s equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV
ACOUSTICS AND EM – FIELDS:

Objective: The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

ACOUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

ELECTRO-MAGNETIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations (Calculus approach).

UNIT – V
QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

**BAND THEORY OF SOLIDS:** Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**

**SEMICONDUCTOR PHYSICS:**
Objective: In the wake of ever increasing demand for the space and power the watch word “small is beautiful”, understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.


**TEXT BOOKS**
1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.)
3. Engineering Physics by M.R. Srinivasan (New Age international publishers)

**REFERENCE BOOKS**
1. ‘Introduction to solid state physics’ by Charles Kittle (Willey India Pvt. Ltd).
4. ‘Engineering Physics’ by Palanisamy (Scitech Publishers).
5. ‘Engineering Physics’ by D.K.Bhattacharya (Oxford University press).
7. ‘Engineering Physics’ by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
UNIT I : Human Values:

UNIT II : Engineering Ethics:

UNIT III : Engineering as Social Experimentation:

UNIT IV : Engineers’ Responsibility for Safety and Risk:

UNIT V : Engineers’ Responsibilities and Rights:
Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**

**Text Books:**

4. “Professional Ethics and Human Values” by Prof.D.R.Kiran
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication.
Objective:
Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.
Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

REFERENCE BOOKS:
I Year – II SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6 Body language
UNIT 7 Dialogues
UNIT 8 Interviews and Telephonic Interviews
UNIT 9 Group Discussions
UNIT 10 Presentation Skills
UNIT 11 Debates

Text Book:

‘Strengthen your Communication Skills’ Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications).
I Year – II SEMESTER

ENGINEERING PHYSICS LAB

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-
   Normal incidence
3. Determination of thickness of a thin object using parallel
   interference fringes.
4. Determination of Rigidity modulus of a material- Torsional
   Pendulum.
5. Determination of Acceleration due to Gravity and Radius of
   Gyration- Compound Pendulum.
7. Verification of laws of stretched string – Sonometer.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Thermistor characteristics – Temperature Coefficient.
13. Magnetic field along the axis of a current carrying coil – Stewart
    and Gee’s apparatus.
15. Hall Effect for semiconductor.

REFERENCE:

1. Engineering Physics Lab Manual by Dr.Y. Aparna &
   Dr.K.Venkateswarao (V.G.S.Book links)
List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in
ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP:

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

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

Trade:

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

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

- **Black Smithy**
  - 1. Round rod to Square
  - 2. S-Hook
  - 3. Round Rod to Flat Ring
  - 4. Round Rod to Square headed bolt

- **House Wiring**
  - 1. Parallel / Series Connection of three bulbs
  - 2. Stair Case wiring
  - 3. Florescent Lamp Fitting
  - 4. Measurement of Earth Resistance

- **Tin Smithy**
  - 1. Taper Tray
  - 2. Square Box without lid
  - 3. Open Scoop
  - 4. Funnel

IT WORKSHOP:

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

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.
Internet & World Wide Web:
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.

Productivity tools Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware
Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

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

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

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

Task 5:
Hardware Troubleshooting (Demonstration):
Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

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

Internet & Networking Infrastructure

Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are
acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9: MS Word Orientation:**
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10: Creating project:** Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

**Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter,
notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

**TEXT BOOK:**

Faculty to consolidate the workshop manuals using the following references

3. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu
Course Objective:
To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

UNIT – I
Learning Objective: To know the basic concepts of bonds in metals and alloys. To understand the basic requirements for the formation of solid solutions and other compounds.

UNIT –II
Learning objectives: To understand the regions of stability of the phases that can occur in an alloy system in order to solve the problems in practical metallurgy.
Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe3C.

UNIT –III
Learning objectives: To study the basic differences between cast irons and steels, their properties and practical applications.
Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.
UNIT – IV
Learning objectives: To study the affect of various alloying elements on iron-iron carbide system. To understand the various heat treatment and strengthening processes used in practical applications.


UNIT – V
Learning objectives: To study the properties and applications of widely used non-ferrous metals and alloys so as to use the suitable material for practical applications.


UNIT – VI
Learning objectives: To study the properties and applications of ceramic, composite and other advanced materials so as to use the suitable material for practical applications.

Ceramic and composite materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials – definition, properties and applications of the above.


TEXT BOOKS:
1. Introduction to Physical Metallurgy - Sidney H. Avener - McGrawHill

REFERENCES :
1. Material Science and Metallurgy – Dr. V.D.kodgire.
2. Materials Science and engineering - Callister & Baalasubrahmanyam
4. Material science and Engineering - V. Rahghavan
Objective:
The students completing this course are expected to understand the basic terms like stress, strain, poisson's ratio...etc and different stresses induced in beams, thin cylinders, thick cylinders, columns. Further, the student shall be able to understand the shear stresses in circular shafts.

UNIT – I
Objective: After studying this unit student will know the basic terms like stress, strain poisson's ratio...etc and stresses in bars of varying cross sections, composite bars, thermal stress in members, stresses on inclined planes with analytical approach and graphical approach, strain energy under different loadings and also problem solving techniques.


UNIT – II
Objective: After studying this unit student will know the construction of shear force diagrams and bending moment diagrams to the different loads for the different support arrangements and also problem solving techniques.

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
Objective: After studying this unit student will know the bending and shear stress induced in the beams which are made with different cross sections like
rectangular, circular, triangular, I, T angle sections and also problem solving techniques.


**SHEAR STRESSES**: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

**UNIT – IV**

**Objective**: After studying this unit student will know how to finding slope and deflection for different support arrangements by Double integration method, Macaulay’s method and Moment-Area and also problem solving techniques.

**DEFLECTION OF BEAMS**: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

**Brief explanation of Statically Indeterminate Beams and solution methods.**

**UNIT – V**

**Objective**: After studying this unit student will know how a cylinder fails, what kind of stresses induced in cylinders subjected to internal, external pressures and also problem solving techniques.


**THICK CYLINDERS**: –lame’s equation – cylinders subjected to inside & outside pressures –compound cylinders.

**UNIT – VI**

**Objective**: After studying this unit student will know shear stresses induced in circular shafts, discussing columns in stability point of view and columns with different end conditions.
**TORSION:** Introduction-Derivation- Torsion of Circular shafts- Pure Shear- Transmission of power by circular shafts, Shafts in series, Shafts in parallel.

**COLUMNS:** Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler’s Formula, Rankine’s Formula.

**TEXT BOOKS:**
2. Solid Mechanics, by Popov.

**REFERENCES :**
Course Objectives: To impart the knowledge of the thermodynamic laws and principles so as to enable the student to prepare an energy audit of any mechanical system that exchange heat and work with the surroundings.

UNIT – I
Objectives: The student should be able to understand the basic concepts like thermodynamic system, its boundary and related fundamental definitions. Distinction between point function and path function shall be made with respect to energy, work and Heat.


UNIT II
Objectives: To learn the first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems. To understand the concept of equality of temperature and the principle of operation of various temperature measuring devices. To learn the applications of steady flow energy equation to the various mechanical components.


UNIT – III
Objectives: To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Should be able to analyse the concepts of Carnot cycle, entropy, availability and
irreversibility. Should be able to understand the use of Maxwells relations and thermodynamic functions.


UNIT IV
**Objectives:** should understand the process of steam formation and its representation on property diagrams with various phase changes and should be able to calculate the quality of steam after its expansion in a steam turbine, with the help of standard steam tables and charts.


UNIT – V
**Objectives:** Should be able to use Psychrometric chart and calculate various psychrometric properties of air.


UNIT - VI
**Objectives:** To understand the concept of air standard cycles and should be able to calculate the efficiency and performance parameters of the systems that use these cycles.

**Power Cycles :** Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and
representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.


**TEXT BOOKS**:
1. Engineering Thermodynamics, PK Nag 4th Edn, TMH.

**REFERENCES**:
1. Engineering Thermodynamics – Jones & Dugan PHI
2. Thermodynamics – J.P.Holman, McGrawHill
Unit – I:
(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II:
(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III:
(*The Learning Objective of this Unit is to understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods).

Introduction to Markets, Theories of the Firm & Pricing Policies:
(*One has to understand the nature of different markets and Price Output determination under various market conditions)

**Unit – IV:**
*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles*  
**Types of Business Organization and Business Cycles:**  
(*One should equipped with the knowledge of different Business Units)

**Unit – V:**
*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation*.

**Introduction to Accounting & Financing Analysis:**  
(*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis).

**Unit – VI:**
*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods*.

(*The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making).  
**Note:** *Learning Objective  
** Learning Assessment

**TEXT BOOKS**  

REFERENCES:
1. V. Maheswari : Managerial Economics, Sultan Chand.
Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

i. To learn the basic principles of electrical law’s and analysis of networks.
ii. To understand the principle of operation and construction details of DC machines.
iii. To understand the principle of operation and construction details of transformer.
iv. To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
v. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPS.
vi. To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I

ELECTRICAL CIRCUITS: Basic definitions, Types of network elements, Ohm’s Law, Kirchhoff’s Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT - II

DC MACHINES : Principle of operation of DC generator – emf equation - types – DC motor types –torque equation – applications – three point starter, swinburn’s Test, speed control methods.

UNIT - III

TRANSFORMERS: Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

UNIT - IV

AC MACHINES: Principle of operation of alternators – regulation by

UNIT V
RECTIFIERS & LINEAR ICs: PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non inverting, integrator and differentiator).

UNIT VI
TRANSISTORS: PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Outcomes:
  i. Able to analyse the various electrical networks.
  ii. Able to understand the operation of DC generators, 3-point starter and conduct the Swinburne’s Test.
  iii. Able to analyse the performance of transformer.
  iv. Able to explain the operation of 3-phase alternator and 3-phase induction motors.
  v. Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
  vi. Able to explain the single stage CE amplifier and concept of feedback amplifier.

TEXT BOOKS:
  3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

REFERENCE BOOKS:
  4. Industrial Electronics by G.K. Mittal, PHI.
Course Objective:
To enhance the student’s knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modeling.

Unit-I:
Objective: The knowledge of projections of solids is essential in 3D modeling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids.

PROJECTIONS OF PLANES & SOLIDS : Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Unit-II:
The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic.

DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

Unit-III:
Isometric projections provide a pictorial view with a real appearance. Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.
Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

In part B computer aided drafting is introduced.

Unit IV:
The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.

Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling.

Unit V:
By going through this topic the student will be able to understand the paper-space environment thoroughly. View points and view ports: view point coordinates and view (s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

Unit VI:
The objective is to make the students create geometrical model of simple solids and machine parts and display the same as an Isometric, Orthographic or Perspective projection.


TEXTBOOKS:
2. Engineering drawing by N.D Bhatt, Charotar publications.
REFERENCES:

5. Engineering Drawing – RK Dhawan, S Chand
Section A: Electrical Engineering:
The following experiments are required to be conducted as compulsory experiments:
1. Swinburne’s test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
3. Brake test on 3-phase Induction motor (Determination of performance characteristics).
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control  b) Field flux control method

Section B: Electronics Engineering:
1. PN junction Diode characteristics A. Forward bias, B. Reverse bias. (Cut in voltage & Resistance calculations)
2. Transistor CE Characteristics (Input and Output).
3. Full wave Rectifier with and without filters.
4. CE Amplifiers.
5. RC Phase Shift Oscillator.
6. Class A Power Amplifier.
Course Objective:
To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

NOTE: Any 6 experiments from each section A and B.

(A) MECHANICS OF SOLIDS LAB :
1. Direct tension test
2. Bending test on
   a) Simple supported
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinells hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

(B) METALLURGY LAB :
1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.
Objective:
The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

UNIT – I
Objective: The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.

UNIT – II
Objective: The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism.

UNIT – III
Objective: The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical
methods and principles and application of four bar chain. To understand the
application of slider crank mechanism etc. and study of plane motion of the
body.

KINEMATICS: Velocity and acceleration – Motion of a link in machine –
Determination of Velocity and acceleration diagrams – Graphical method –
Application of relative velocity method four bar chain. Velocity and
acceleration analysis of for a given mechanism, Kleins construction, Coriolis
acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids and axodes –
relative motion between two bodies – Three centres in line theorem –
Graphical determination of instantaneous centre, diagrams for simple
mechanisms and determination of angular velocity of points and links.

UNIT – IV
Objective The objective of this unit is to make student understand the
theories involved in cams. Further the students are exposed to the
applications of cams and their working principles.

CAMS
Definitions of cam and followers – their uses – Types of followers and cams
– Terminology –Types of follower motion: Uniform velocity, Simple
harmonic motion and uniform acceleration and retardation. Maximum
velocity and maximum acceleration during outward and return strokes in the
above 3 cases. Analysis of motion of followers: Roller follower – circular
cam with straight, concave and convex flanks.

UNIT – V
Objective: The objective of this unit is to make student understand gears,
power transmission through different types of gears including gear profiles
and its efficiency.

Gears: Higher pairs, friction wheels and toothed gears–types – law of
gearing, condition for constant velocity ratio for transmission of motion,
Form of teeth: cycloidal and involute profiles. Velocity of sliding –
phenomena of interferences – Methods of interference. Condition for
minimum number of teeth to avoid interference, expressions for arc of
contact and path of contact – Introduction to Helical, Bevel and worm
gearing.

UNIT – VI
Objective: The objective of this unit is to make student understand various
power transmission mechanisms and methodologies and working principles.
Students are exposed to merits and demerits of each drive. Power
Transmissions : Introduction, Belt and rope drives, selection of belt drive-
types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:
2. Theory of Machines – S. S Rattan- TMH.

REFERENCES:
1. Theory of Machines Sadhu Singh Pearsons Edn
3. Theory of Machines by Thomas Bevan/ CBS
UNIT – I
Objectives: To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation.


UNIT – II
Objectives: To familiarize the student with the various engine systems along with their function and necessity.


UNIT – III
Objectives: To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of ) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.


UNIT – IV
Objectives: To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.

Measurement, Testing and Performance : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas

UNIT – V
Objectives: To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.
COMPRESSORS – Classification – positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.
Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VI
Objectives: To make students learn mechanical details, and to calculate power and efficiency of rotary compressors


Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:
1. I.C. Engines / V. GANESAN- TMH
2. Heat engines, vasandani & Kumar publications Thermal

REFERENCES:
II Year – II SEMESTER

PRODUCTION TECHNOLOGY

Course Objective:
To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.

UNIT – I
Objective: To make the students understand fundamentals of casting
CASTING:
Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II
Objective: To provide insight into sand casting and introduce other casting processes
Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT – III
Objective: To impart fundamentals of gas welding and arc welding
Welding:
Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting.
Basic principles of Arc welding, Manual metal arc welding, Sub merged arc welding, Inert Gas welding- TIG & MIG welding.

UNIT – IV
Objective: To teach principles of advanced welding processes and their applications
Heat affected zones in welding; pre & post heating, Weldability of metals, welding defects – causes and remedies – destructive and nondestructive testing of welds, Design of welded joints.

UNIT – V
Objective: To impart knowledge on bulk forming processes
Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing.
Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.
Introduction to powder metallurgy – compaction and sintering, advantages and applications

UNIT – VI
Objective: To provide understanding of various sheet metal forming and processing of plastics.
Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations,
Deep drawing, Stretch forming, Bending, Springback and its remedies, Coining, Spinning, Types of presses and press tools.
Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods,
Blow and Injection molding.

TEXT BOOKS:

REFERENCES :
2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology- R.K. Jain- Khanna
4. Production Technology-P C Sharma-S. Chand
5. Manufacturing Processes- H.S. Shaun- Pearson
Objective:
The students completing this course are expected to understand the properties of fluids, its kinematic and dynamic behavior through various laws of fluids like continuity, Euler’s, Bernoulli’s equations, energy and momentum equations. Further, the student shall be able to understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.

UNIT I
Objective: After studying this unit student will know the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.


UNIT II
Objective: In this unit student will be exposed to the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.


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

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 III

Objective: At the end of this unit student will be aware of the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.

Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Dimensional Analysis: Similitude and modeling – Dimensionless numbers

UNIT IV

Objective: In this unit student will know the hydrodynamic forces acting on vanes and their performance evaluation.

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

UNIT V

Objective: At the end of this unit student will be aware of the importance, function and performance of hydro machinery.

Centrifugal pumps: Classification, working, work done – manometric head-losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH.

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

UNIT VI

Objective: After studying this unit student will be in a position to evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.

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.

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.
5. Fluid Mechanics and Hydraulic Machines by Domkundwar & Domkundwar, Dhanpatrai & Co.
Course Objective:
The student will acquire a knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

Machine Drawing Conventions:
Need for drawing conventions – introduction to IS conventions
  a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
  b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
  c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
  d) Title boxes, their size, location and details - common abbreviations & their liberal usage.
  e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts
Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts Selection of Views, additional views for the following machine elements and parts with every drawing proportions.
  a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
  b) Keys, cottered joints and knuckle joint.
  c) Rivetted joints for plates
  d) Shaft coupling, spigot and socket pipe joint.
  e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:
Objective: The student will be able to draw the assembly from the individual part drawing.
Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.
a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

**NOTE** : First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

**TEXT BOOKS:**


**REFERENCES:**

2. Machine Drawing – P.S.Gill,
Course Objective: To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

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.
II Year – II SEMESTER

PRODUCTION TECHNOLOGY LAB

Course Objective: To impart hands-on practical exposure on manufacturing processes and equipment.

Minimum of 12 Exercises need to be performed

I. METAL CASTING:
   1. Pattern Design and making - for one casting drawing.
   2. Sand properties testing - for strength and permeability
   3. Mould preparation, Melting and Casting

II WELDING:
   1. Gas welding
   2. Gas cutting
   3. Manual metal arc welding - Lap & Butt Joints
   4. TIG/MIG Welding
   5. Resistance Spot Welding
   6. Brazing and soldering

III METAL FORMING AND POWDER METALLURGY:
   1. Blanking & Piercing operations and study of simple, compound and progressive dies.
   2. Deep drawing and extrusion operations.
   3. Bending and other operations
   4. Basic powder compaction and sintering

IV PROCESSING OF PLASTICS
   1. Injection Moulding
   2. Blow Moulding
Objective: To impart practical exposure to the student on the performance evaluation methods of various types of internal combustion engines and compressors.

1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test (4-stroke diesel engines)
3. I.C. Engines performance test on 2-stroke petrol.
4. Evaluation of engine friction by conducting morse test on 4-stroke multi cylinder petrol engine.
5. Determination of FHP by retardation and motoring test on IC engine.
8. Performance test on variable compression ratio engines.
9. Performance test on reciprocating air compressor unit.
10. Study of boilers

Outcomes:
The student will be able to calculate the various efficiencies, various horse powers and energy balance for several types of Internal Combustions Engines and compressors.
Course Objectives:
1. To equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems, vibrations.
2. Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of vibrations and its significance on engineering design.
4. Develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces and moments.

UNIT – I
PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms, (Demonstration of models in video show).

UNIT – II
FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT – III
TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-IV
GOVERNERS: Watt, porter and proell governors, spring loaded governors
– Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of “V” multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – VI

VIBRATIONS: Free Vibration of spring mass system – oscillation of pendulums, centers of oscillation and suspension. transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly’s methods, Raleigh’s method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS :

REFERENCES :
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers

Course outcomes:
Upon successful completion of this course the student should be able to:
2. Compute frictional losses, torque transmission of mechanical systems.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
4. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
5. Understand balancing of reciprocating and rotary masses.
Course objectives:
1. The course provides students with fundamental knowledge and principles in material removal processes.
2. In this course, the students apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, and drill presses, Computer Numerical Control etc.
3. To demonstrate the fundamentals of machining processes and machine tools.
4. To develop knowledge and importance of metal cutting parameters.
5. To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
6. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes.

UNIT – I
FUNDAMENTALS OF MACHINING:
Elementary treatment of metal cutting theory – element of cutting process – geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting – Merchant’s force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT – II
LATHE MACHINES:
UNIT – III
SHAPING, SLOTTING AND PLANNING MACHINES: Principles of working – principal parts – specifications, operations performed, machining time calculations.


UNIT – IV

UNIT – V
FINISHING PROCESSES: Theory of grinding – classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT - VI
JIGS & FIXTURES: Principles of design of jigs and fixtures and uses, classification of jigs & fixtures, principles of location and clamping, types of clamping & work holding devices, typical examples of jigs and fixtures.

CNC MACHINE TOOLS: CNC Machines, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines.

TEXT BOOKS:
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

REFERENCES:
1. Metal cutting Principles by M.C. Shaw
2. Metal cutting and machine tools by Boothroyd
5. Manufacturing technology II, P.N Rao
6. Technology of machine tools, S.F.Krar, A.R. Gill, Peter SMID, TMH (I)

**Course Outcomes:**

Upon successful completion of this course, the students will be able to:

1) Apply cutting mechanics to metal machining based on cutting force and power consumption.
2) Operate lathe, milling machines, drill press, grinding machines, etc.
3) Select cutting tool materials and tool geometries for different metals.
4) Select appropriate machining processes and conditions for different metals.
5) Learn machine tool structures and machining economics.
6) Write simple CNC programs and conduct CNC machining.
Course Objectives:
1. The student shall gain appreciation and understanding of the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturing activity.
2. Selection of proper materials to different machine elements based on their physical and mechanical properties.
3. Learn and understanding of the different types of failure modes and criteria.
4. Procedure for the different machine elements such as fasteners, shafts, couplings, keys, axially loaded joints etc.

UNIT – I
INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits –BIS codes of steels.


UNIT – II

UNIT – III
Riveted and welded joints – design of joints with initial stresses – eccentric loading.
Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, different seals.
UNIT – IV
KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints-knuckle joints.
SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).

UNIT – V
SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

UNIT – VI
MECHANICAL SPRINGS:
Stresses and deflections of helical springs – extension-compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.

TEXT BOOKS:
2. Machine design – Pandya & Shah

REFERENCES:
1. Design of Machine Elements / V.M. Faires
3. Data books (1) PSG College of technology (2) Mahadevan

Course outcomes:
Upon successful completion of this course student should be able to:
1. Apply the design procedure to engineering problems, including the consideration of technical and manufacturing constraints.
2. Select suitable materials and significance of tolerances and fits in critical design applications.
3. Utilize design data hand book and design the elements for strength, stiffness and fatigue.
4. Identify the loads, the machine members subjected and calculate static and dynamic stresses to ensure safe design.
INSTRUMENTATION & CONTROL SYSTEMS

Course Objectives:
The course focuses on imparting the principles of measurement which includes the working mechanism of various sensors and devices, that are in use to measure the important physical variables of various mechatronic systems.

UNIT – I

Measurement of Displacement: Theory and construction of various transducers to measure displacement – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

MEASUREMENT OF PRESSURE: Units – classification – different principles used. manometers, piston, bourdon pressure gauges, bellows – diaphragm gauges. low pressure measurement – thermal conductivity gauges – ionization pressure gauges, mcleod pressure gauge.

UNIT – III
MEASUREMENT OF LEVEL: Direct method – indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, ultrasonic, turbine flow meter, hot – wire anemometer, laser doppler anemometer (LDA).

MEASUREMENT OF SPEED: Mechanical tachometers – electrical tachometers – stroboscope, noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments – principles of seismic instruments – vibrometer and accelerometer using this principle.
UNIT – IV

UNIT – V
MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, absorption psychrometer, dew point meter.
MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, torsion meters, dynamometers.

UNIT – VI

TEXT BOOKS:
2. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE.

REFERENCES:
1. Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh/ TMH.
2. Experimental Methods for Engineers / Holman.
4. Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH.

Course outcomes:
After undergoing the course the student can select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.
Course objectives:
This course is intended to provide basic knowledge of components being used in steam and gas power plant cycles and to analyse the energy transfers and transformations in these components including individual performance evaluation.

UNIT – I

UNIT II

UNIT – III
STEAM NOZZLES: Function of a nozzle – applications - types, flow through nozzles, thermodynamic analysis – assumptions -velocity of fluid at nozzle exit-Ideal and actual expansion in a nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

STEAM TURBINES: Classification – impulse turbine; mechanical details – velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-laval turbine - methods to reduce rotor speed-velocity compounding, pressure compounding and velocity & pressure compounding, velocity and pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine, condition for maximum efficiency.
UNIT IV


UNIT – V

UNIT – VI
JET PROPULSION: Principle of operation – classification of jet propulsive engines – working principles with schematic diagrams and representation on t-s diagram - thrust, thrust power and propulsion efficiency – turbo jet engines – needs and demands met by turbo jet – schematic diagram, thermodynamic cycle, performance evaluation, thrust augmentation – methods.


TEXT BOOKS:
2. Gas Turbines – V.Ganesan /TMH

REFERENCES:
2. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
5. Thermal Engineering-M.L.Marthur & Mehta/Jain bros

**Course outcomes:**
After undergoing this course the student is expected to understand the working of steam and gas power plant cycles and also should be able to analyze and evaluate the performance of individual components. The student also should be in a position to understand basic principles of Jet propulsion and rocket engineering.
Course objectives:
The students will learn
1. Inspection of engineering parts with various precision instruments.
2. Design of part, tolerances and fits.
4. Evaluation and inspection of surface roughness.
5. Inspection of spur gear and thread elements.

UNIT-I
SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits - Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, deterministic & statistical tolerancing, selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

UNIT-II
LINEAR MEASUREMENT: Length standards, end standards, slip gauges-calibration of the slip gauges, dial indicators, micrometers.
MEASUREMENT OF ANGLES AND TAPERS:
Different methods – bevel protractor, angle slip gauges- angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to measure angles and tapers.
LIMIT GAUGES:
Taylor’s principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-III
OPTICAL MEASURING INSTRUMENTS: Tools maker’s microscope and uses - autocollimators, optical projector, optical flats and their uses.
INTERFEROMETRY:
Interference of light, Michaleson’s interferometer, NPL flatness interferometer, and NPL gauge interferometer.

UNIT-IV
SURFACE ROUGHNESS MEASUREMENT: Differences between

**COMPANATORS:** Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.

**UNIT – V**

**GEAR MEASUREMENT:** Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.

**SCREW THREAD MEASUREMENT:** Elements of measurement – errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

**UNIT – VI**

**FLATNESS MEASUREMENT:**
Measurement of flatness of surfaces- instruments used- straight edges- surface plates – auto collimator.

**MACHINE TOOL ALIGNMENT TESTS:** Principles of machine tool alignment testing on lathe, drilling and milling machines.

**TEXT BOOKS:**
2. Engineering Metrology by Mahajan / Dhanpat Rai Publishers

**REFERENCE BOOKS:**
3. Precision Engineering in Manufacturing by R.L.Murthy / New Age.

**Course outcomes:**
Students will be able to design tolerances and fits for selected product quality. They can choose appropriate method and instruments for inspection of various gear elements and thread elements. They can understand the standards of length, angles, they can understand the evaluation of surface finish and measure the parts with various comparators. The quality of the machine tool with alignment test can also be evaluated by them.
Course Objectives:
The Metrology and instrumentation Laboratory course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments. They also understand the machine tool alignment test. Instrumentation lab introduces the students with the theory and methods for conducting experimental work in the laboratory and calibration of various instruments for measuring pressure, temperature, displacement, speed, vibration etc.

Note: The students have to conduct at least 8 experiments from each lab.

METROLOGY LAB

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier caliper for tooth thickness inspection and flange micro meter for checking the chordal thickness of spur gear.
5. Machine tool alignment test on drilling machine.
7. Angle and taper measurements with bevel protractor, Sine bars, rollers and balls.
8. Use of spirit level in finding the straightness of a bed and flatness of a surface.
9. Thread inspection with two wire/ three wire method & tool makers microscope.
10. Surface roughness measurement with roughness measuring instrument.

INSTRUMENTATION LAB

1. Calibration of pressure gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
5. Calibration of thermocouple.
7. Study and calibration of photo and magnetic speed pickups.
9. Study and calibration of a rotameter.
10. Study and use of a seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.

Course outcomes:

Metrology Lab
Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc).

Instrumentation Lab:
Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.
III Year – I SEMESTER

MACHINE TOOLS LAB

Course objectives:
The students are required to understand the parts of various machine tools and operate them. They are required to understand the different shapes of products that can be produced on these machine tools.

1. Introduction of general purpose machines - lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on lathe machine.
4. Drilling and tapping
5. Shaping and planning
6. Slotting
7. Milling
8. Cylindrical surface grinding

Course outcomes:
The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.
III Year – I SEMESTER

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I

Unit II

Unit III

Unit IV

Unit V
Unit VI

REFERENCE BOOKS:
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections.
Course Objectives:
To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and business applications and to use the various techniques of Operations Research in solving such problems.

UNIT – I
Development – definition– characteristics and phases – types of operation research models – applications.


UNIT – II


UNIT – III
REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT – IV

UNIT – V
INVENTORY: Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no setup cost. ABC & VED Analysis.

UNIT – VI

TEXT BOOKS:
1. Operations Research / S.D.Sharma-Kedarnath

REFERENCES:
1. Introduction to O.R/Hiller & Libermann (TMH).

Course Outcomes:
After completion of the course, the student will be able to:
To solve the LP and DP problems.
To solve the Transportation, assignment, game, inventory, replacement, sequencing, queuing problems.
Course objectives:
This course allows the students to:

1. Understand the fundamental concepts and theory of computer graphics.
2. Understand modeling, and interactive control of 3D computer graphics applications.
3. The underlying parametric surface concepts be understood.
4. Learn multimedia authoring tools.

UNIT-I
INTRODUCTION: Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT-II
OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, mid-point circle algorithm,
Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.
2-D GEOMETRICAL TRANSFORMATIONS: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

UNIT-III
2-D VIEWING : The viewing pipe-line, viewing coordinat4 reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT -IV
3-D OBJECT REPRESENTATION: spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, , Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms.
UNIT -V

3-D GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

UNIT-VI

COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification.

TEXT BOOKS:

REFERENCES:
4. Computer Graphics, Steven Harrington, TMH.

Course outcomes:
Upon successful completion of the course, students will be able to:
1. Use the principles and commonly used paradigms and techniques of computer graphics.
2. Write basic graphics application programs including animation.
3. Design programs to display graphic images to given specifications.
4. Possess in-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.
Course Objectives:

- This course gives the insight of slider and roller bearings and the life prediction.
- Learn to design I.C engine parts.
- Design the mechanical systems for power transmission elements such as gears, belts, ropes, chains, keys and levers.

UNIT – I

UNIT – II
ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts.

UNIT –III
Pistons, forces acting on piston – construction design and proportions of piston, cylinder, cylinder liners.

UNIT – IV
Design of curved beams: introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section, design of crane hooks, c –clamps.

UNIT – V
POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by belt and rope drives , transmission efficiencies, belts – flat and v types – ropes - pulleys for belt and rope drives, materials, chain drives
DESIGN OF POWER SCREWS: Design of screw, square ACME, buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.
UNIT – VI


TEXT BOOKS:

REFERENCES:
2. Data Books : (I) P.S.G. College of Technology (ii) Mahadevan

Course outcomes:
At the end of the course
1. The student will able to select the suitable bearing based on the application of the loads and predict the life of the bearing.
2. Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
3. Design of IC Engines parts.
Course Objectives:
1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I

UNIT – II

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV
Differential transformation and manipulators, Jacobians – problems

UNIT V
General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint
integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VI

ROBOT ACTUATORS AND FEED BACK COMPONENTS:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley InterScience.

Course outcomes:
Upon successful completion of this course you should be able to:
1. Identify various robot configuration and components.
2. Select appropriate actuators and sensors for a robot based on specific application.
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains.
4. Perform trajectory planning for a manipulator by avoiding obstacles.
Course Objectives:
This course is intended to impart knowledge of principles of heat transfer and analyze the heat exchange process in various modes for the evaluation of rate of heat transfer and the temperature distribution in different configurations.

UNIT – I
INTRODUCTION: Modes and mechanisms of heat transfer – basic laws of heat transfer – General discussion about applications of heat transfer.

UNIT – II
extended surface (fins) heat Transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature.
ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – significance of biot and fourier numbers - chart solutions of transient conduction systems.

UNIT – III
CONVECTIVE HEAT TRANSFER: Classification of convective heat transfer – dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem for forced and free convection, application for developing semi – empirical non-dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.

UNIT – IV
FORCED CONVECTION
EXTERNAL FLOWS: Concepts about hydrodynamic and thermal
boundary layer and use of empirical correlations for convective heat transfer - flat plates and cylinders.

INTERNAL FLOWS: Concepts about hydrodynamic and thermal entry lengths – division of internal flow based on this – use of empirical relations for horizontal pipe flow and annulus flow.

FREE CONVECTION: Development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for vertical plates and pipes.

UNIT V
HEAT TRANSFER WITH PHASE CHANGE

BOILING: Pool boiling – regimes- calculations on nucleate boiling, critical heat flux and film boiling.

CONDENSATION: Film wise and drop wise condensation – nusselt’s theory of condensation on a vertical plate - film condensation on vertical and horizontal cylinders using empirical correlations.

HEAT EXCHANGERS:

UNIT VI
RADIATION HEAT TRANSFER:


TEXT BOOKS:
1. Heat Transfer - HOLMAN/TMH

REFERENCE BOOKS:

Course outcomes:
The student after undergoing this course is expected to know the principles of heat transfer and be able to apply to practical situations where in heat exchange takes place through various modes of heat transfer including phase change.
Course Objectives:

1. To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering.

2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.

3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.

4. To enable students to understand their role as engineers and their impact to society at the national and global context.

Unit – I
INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor’s principles, theory X and theory Y, Fayol’s principles of management.

Unit – II
PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

Unit – III
OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.
Unit – IV

STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – $\bar{X}$ and R – charts $\bar{X}$ AND S charts and their applications, numerical examples.

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts

Unit – V

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

Unit - VI

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

PROJECT MANAGEMENT: PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

1. Industrial Engineering and management by O.P Khanna, Khanna Publishers.
2. Industrial Engineering and Production Management, Martand Telsang, S.Chand & Company Ltd. New Delhi.

Reference Books:

1. Industrial Management by Bhattacharya DK, Vikas publishers.
3. Industrial Engineering by Banga & Sharma.
5. Statistical Quality Control by Gupta.
Course outcome:
Upon successful completion of this course you should be able to:

1. Design and conduct experiments, analyse, interpret data and synthesise valid conclusions.

2. Design a system, component, or process, and synthesise solutions to achieve desired needs.

3. Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints.

4. Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management.
Course objectives:
The course is to understand the basic cycles of various refrigerating systems, their performance evaluation along with details of system components and refrigerant properties. The course is also aimed at imparting knowledge of psychrometric properties, processes which are used in air conditioning systems for comfort and industrial applications.

UNIT – I
INTRODUCTION TO REFRIGERATION: Necessity and applications – unit of refrigeration and C.O.P. – Mechanical refrigeration – types of ideal cycles of refrigeration. air refrigeration: bell coleman cycle - open and dense air systems – refrigeration systems used in air crafts and problems.

UNIT – II

UNIT III


UNIT IV
VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of NH₃ – water system and Li Br – water ( Two shell & Four shell) System, principle of operation three fluid absorption system, salient features.
STEAM JET REFRIGERATION SYSTEM: Working Principle and basic components. principle and operation of (i) thermoelectric refrigerator (ii) vortex tube.

UNIT – V
INTRODUCTION TO AIR CONDITIONING: Psychometric properties & processes – characterization of sensible and latent heat loads — need for ventilation, consideration of infiltration – load concepts of RSHF, GSHF-problems, concept of ESHF and ADP temperature.

Requirements of human comfort and concept of effective temperature-comfort chart –comfort air conditioning – requirements of industrial air conditioning, air conditioning load calculations.

UNIT – VI
AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. heat pump – heat sources – different heat pump circuits.

TEXT BOOKS:
2. Refrigeration and Air Conditioning / CP Arora / TMH.

REFERENCES:
1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.
3. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH

Course outcomes: At the end of the course the students should be able to:
After undergoing the course the student should be in a position to analyze various refrigerating cycles and evaluate their performance. The student also should be able to perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial airconditioning.
COMPUTATIONAL FLUID DYNAMICS
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:
The course aims at providing required numerical and software techniques for solving various engineering problems involving fluid flow.

UNIT-I
ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton’s second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.

UNIT - III
Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation.
Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV
Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - V
Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.
UNIT -VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:


REFERENCES:

3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Course Outcomes:
After undergoing the course the student shall be able to apply various numerical tools like finite volume, finite difference etc for solving the different fluid flow problems.
CONDITION MONITORING
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

- This course is designed to introduce the benefits and opportunities of health Monitoring and covers a range of techniques.
- The students will be exposed to a range of techniques from Vibration based methods, Thermography, Oil conditions, Debris and ultrasonic monitoring.
- Using overall vibration, vibration limit zones, broadband vibration bandwidth, alert levels, typical severity guidelines, recording overall vibration, using overall vibration for fault finding, trending overall vibration.


UNIT-I
BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, basic parameters: displacement, velocity, acceleration, units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II
VIBRATION MEASUREMENTS AND ANALYSIS: Transducers and mounting methods, data acquisition using instrumentation recorders/data loggers, time domain signal analysis, orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

VIBRATION MEASUREMENT AND ANALYSIS: Use of phase; bode, polar and water fall plots, constant percentage band width analysis (1/3 and 1/1 Octave analysis), envelope detection /spike energy analysis, cepstral analysis, advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-III
Fault Diagnosis, Interpreting vibration measurements for common machine faults, imbalance, misalignment, mechanical looseness, bearing and gearing faults, faults in induction motors, resonances, some case studies, static and
dynamic balancing, international standards for vibration condition monitoring.

UNIT-IV
THERMOGRAPHY: The basics of infrared thermography, differences in equipment and specific wave length limitations, application of ir to: electrical inspection, mechanical inspection, energy conservation, how to take good thermal images, hands-on demonstrations focusing on proper camera settings and image interpretation, analysis of thermal images and report generation, study of thermography applications

UNIT-V
OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, monitoring condition of oil, lubricant analysis, physio – chemical properties, moisture, tan tbn, wear debris analysis, particle counting, spectroscopy, uses & limitations, ferrography wear particle analysis, concept of ferrography, principle particle classification, size, shape, composition, concentration, analysis procedure, sampling & analytical ferrography equipments, severity rating.

UNIT-VI
ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic monitoring (leak, crack and thickness) basics of ultrasonic monitoring, ultrasonic theory, test taking philosophy, ultrasonic theory, mathematics of ultrasound, equipment and transducers, inspection parameters and calibration, immersion theory, equipment quality control, flaw origins and inspection methods, UT Procedure familiarization, and study recommendations, application of ultrasound to: air leaks, steam trap testing, bearing lubrication, electrical inspection, case studies.

TEXT BOOKS:

REFERENCE BOOKS:
Course outcomes:

- Gaining invaluable insights into the benefits of Condition Monitoring.
- Understanding the reasons for selecting particular maintenance strategies.
- Understanding effective methodologies for implementing Condition Monitoring Techniques.
- Identifying the optimum maintenance strategy for different types of equipment.
- Gaining practical approaches to minimise the risk of plant and machinery breakdowns.
- Awareness of International Standards covering asset management.
RAPID PROTOTYPING
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:
The course aims at the importance of Rapid Prototyping, classifications, models, specifications of various Rapid Prototype Techniques. To learn the different tools, soft-wares required and the applications of Rapid Prototyping.

UNIT – I
INTRODUCTION: Prototyping fundamentals, historical development, fundamentals of rapid prototyping, advantages and limitations of rapid prototyping, commonly used terms, classification of RP process.

UNIT-II
SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated object manufacturing (LOM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modeling (FDM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT – III
POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): models and specifications, process, working principle, applications, advantages and disadvantages, case studies. three dimensional printing (3DP): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-IV
RAPID TOOLING: Introduction to rapid tooling (RT), conventional tooling Vs RT, Need for RT, rapid tooling classification: indirect rapid tooling methods: spray metal deposition, RTV epoxy tools, Ceramic tools, investment casting, spin casting, die casting, sand casting, 3D Keltool process. Direct rapid tooling: direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.
UNIT – V
RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, Newly Proposed Formats.

RAPID PROTOTYPING SOFTWARE’S: Features of various RP software’s like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.

UNIT – VI
RP APPLICATIONS: Application in engineering, analysis and planning, aerospace industry, automotive industry, jewelry industry, coin industry, GIS application, arts and architecture. RP medical and bioengineering applications: planning and simulation of complex surgery, customized implants & prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bimolecular.

TEXT BOOK:

REFERENCE BOOKS:

Course Outcomes:
The student shall be able to identify the use of Rapid Prototyping Techniques in the manufacturing of complex components that are otherwise very difficult to manufacture.
HEAT TRANSFER LAB

Objectives:
The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries.

1. Determination of overall heat transfer co-efficient of a composite slab.
2. Determination of heat transfer rate through a lagged pipe.
3. Determination of heat transfer rate through a concentric sphere.
4. Determination of thermal conductivity of a metal rod.
5. Determination of efficiency of a pin-fin.
6. Determination of heat transfer coefficient in forced convection.
10. Determination of Stefan Boltzman constant.

Outcomes: The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers.
Course Objectives:
The course imparts the principles of automobile systems and provides the salient features of safety, emission and service of automobiles.

UNIT – I

UNIT – II
TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III
STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – IV
SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.
ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting
systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – V
ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introduction-engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.
Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

UNIT – VI
ENGINE EMISSION CONTROL: Introduction – types of pollutants, mechanism of formation, concentration measurement, methods of controlling-engine modification, exhaust gas treatment-thermal and catalytic converters-use of alternative fuels for emission control – National and International pollution standards
ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston-connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.

TEXT BOOKS:

REFERENCES:
2. Automotive Engineering / Newton Steeds & Garrett.

Course Outcomes:
The student after undergoing the course, shall visualize the layout of an automobile and its systems like transmission, steering, suspension, braking, safety etc and should know the vehicle troubleshooting.
Course Objectives:
The general objectives of the course are to enable the students to

1. Understand the basic fundamentals of computer aided design and manufacturing.
2. To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc.
3. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication.
4. To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control.
5. To learn the overall configuration and elements of computer integrated manufacturing systems.

UNIT – I
Computers in industrial manufacturing, product cycle, CAD / CAM Hardware, basic structure, CPU, memory types, input devices, display devices, hard copy devices, storage devices.

COMPUTER GRAPHICS: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – II
GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

DRAFTING AND MODELING SYSTEMS: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – III
Direct Numerical Control, Adaptive Control.

UNIT – IV
GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, types and advantages.
Computer aided processes planning – importance, types.

UNIT – V
COMPUTER AIDED QUALITY CONTROL: Terminology used in quality control, use of computers in Quality control. Inspection methods- contact and noncontact types, computer aided testing, integration of CAQC with CAD/CAM.

UNIT – VI
COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Types of manufacturing systems, machine tools and related equipment, material handling systems, material requirement planning, computer control systems, human labor in manufacturing systems, CIMS benefits.

TEXT BOOKS:
1. CAD / CAM / CAE E Zimmers & M.Groover/Pearson Education
2. Automation, Production systems & Computer integrated Manufacturing/ Groover/P.E

REFERENCES:
1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH.

Course Outcome:
At the end of the course the students shall be able to:
1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix.
2. Describe the use of GT and CAPP for the product development.
3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.
Course Objectives:
1. To learn basic principles of finite element analysis procedure.
2. To learn the theory and characteristics of finite elements that represent engineering structures.
3. To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others.
4. Learn to model complex geometry problems and solution techniques.

UNIT-I
Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.

UNIT – II
Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.

UNIT – III
Analysis of Trusses: Finite element modeling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations. Analysis of Beams: Element stiffness matrix for Hermite beam element, derivation of load vector for concentrated and UDL, simple problems on beams.

UNIT – IV
Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems.

UNIT-V
Higher order and isoparametric elements: One dimensional quadratic and cubic
elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

UNIT – VI
Steady state heat transfer analysis: one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion. Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:
1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.

REFERENCES:

Course outcomes:
Upon successful completion of this course you should be able to:
1. Understand the concepts behind variational methods and weighted residual methods in FEM.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
3. Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
4. Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.
Course Objectives:

- The course aims in identifying the classification of unconventional machining processes.
- To understand the principle, mechanism of metal removal of various unconventional machining processes.
- To study the various process parameters and their effect on the component machined on various unconventional machining processes.
- To understand the applications of different processes.

UNIT – I

INTRODUCTION: Need for non-traditional machining methods-classification of modern machining processes – considerations in process selection, applications.

Ultrasonic machining – Elements of the process, mechanics of material removal, MRR process parameters, economic considerations, applications and limitations.

UNIT – II

ELECTRO – CHEMICAL MACHINING: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy, economic aspects of ECM – Simple problems for estimation of metal removal rate, fundamentals of chemical, machining, advantages and applications.

UNIT - III

THERMAL METAL REMOVAL PROCESSES: General principle and applications of Electric Discharge Machining, Electric Discharge Grinding and wire EDM – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, surface finish and machining accuracy, characteristics of spark eroded surface.
UNIT – VI
Electron Beam Machining, Laser Beam Machining - Basic principle and theory, mechanics of material removal, process parameters, efficiency & accuracy, applications

UNIT-V
**Plasma Machining:** Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

UNIT – VI
Abrasive jet machining, Water jet machining and abrasive water jet machining: Basic principles, equipments, process variables, mechanics of material removal, MRR, application and limitations.
Magnetic abrasive finishing, abrasive flow finishing, Electrostream drilling, shaped tube electrolytic machining.

**TEXT BOOK:**
1. Advanced machining processes/ VK Jain/ Allied publishers.

**REFERENCES:**
1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

**Course outcomes:**
After completion of course, the student shall understand the principle of working, mechanism of metal removal in the various unconventional machining process. The student is able to identify the process parameters, their effect and applications of different processes.
IV Year – I SEMESTER

OPEN ELECTIVE

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Course Objectives:
1. To learn basics of Micro Electro Mechanical Systems (MEMS).
2. To learn about various sensors and actuators used in MEMS.
3. To learn the principle and various devices of MOEMS, Fluidic, bio and chemical systems.

Unit – I
INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.
MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

Unit – II
THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

Unit – III
MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

Unit – IV
MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive
sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

Unit – V
MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.
RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

Unit - VI
CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluorescence detection, calorimetric spectroscopy.

TEXT BOOK:
MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:
1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.

Course outcomes:
Upon successful completion of this course the student shall be able to know the importance and various devices of MEMS and their applications.
NANO TECHNOLOGY
(OPEN ELECTIVE)

Course objective
On successful completion of the course, students should be able to:
Understand the basic scientific concepts of nanoscience. Understand the properties of nano materials, characterization of materials, synthesis and fabrication. Understand the applications of nano technology in various science, engineering and technology fields.

UNIT-I
INTRODUCTION: History of nano science, definition of nano meter, nano materials, nano technology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure.

UNIT-II
PROPERTIES OF MATERIALS:
Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials.

UNIT-III

UNIT-IV
CHARACTERIZATION TECHNIQUES: X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy.

UNIT-V
CARBON NANO TECHNOLOGY:
Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nano crystallling diamond
films, grapheme, applications of carbon nano tubes.

UNIT-VI
APPLICATIONS OF NANO TECHNOLOGY:
Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin fins, applications of quantum dots.

TEXT BOOKS:

REFERENCE BOOKS:
1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
4. Nano Essentials- T.Pradeep/TMH.
6. Principles of Nanotechnology by Phani Kumar, Scitech.

Course outcomes:
Upon successful completion of this course the student shall be able to:
Identify the essential concepts used in nanotechnology. Identify the materials, properties, syntheses and fabrication, characterization and applications in various fields.
DEPARTMENTAL ELECTIVE – II

MATERIAL CHARACTERIZATION TECHNIQUES

Course objective: The course presents the principles and methods of characterizing the structure and other aspects of materials. Various advanced characterizing techniques and their application will be studied.

UNIT -I
Introduction: Scope of subject, classification of techniques for characterization, macro and micro-characterization structure of solids.

UNIT -II
Bulk averaging techniques: Thermal analysis, DTA, DSC, TGA, dilatometry, resistivity/conductivity.

UNIT -III
Optical & X-ray spectroscopy: Atomic absorption spectroscopy, X-ray spectrometry, infrared spectroscopy and Raman spectroscopy.

UNIT -IV
Metallographic techniques: Optical metallography, image analysis, quantitative phase estimation.

UNIT -V
Diffraction methods: X-ray diffraction (crystal systems and space groups, Bravais lattices, direct and reciprocal lattice, Bragg law, powder diffraction and phase identification, single crystal diffraction, structure factor, X-ray crystal structure determination).

UNIT -VI
Electron optical methods: Scanning electron microscopy and image formation in the SEM.

Course outcomes: At the end of the semester, the student should be able to

1. Analyze the microstructure of materials.
2. Apply various characterization techniques like XRD, SEM TEM.
3. Identify the phases existing in the material.
4. Analyze the image.
TEXT BOOKS

REFERENCES:
Course Objectives:
1. Understand the design rules and considerations with reference to various manufacturing processes.
2. To discuss capabilities and limitations of each manufacturing process in relation to part design and cost.
3. To examine DFM principles including how the design affects manufacturing cost, lean manufacturing, six sigma, etc.

UNIT - I
Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production - creativity in design.

UNIT - II
Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III
Metal casting: Appraisal of various casting processes, selection of casting process-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT - IV
Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V
Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.
UNIT – VI

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

TEXT BOOKS:
1. Design for manufacture, John cobert, Adisson Wesley 1995
2. Design for Manufacture by Boothroyd
3. Design for manufacture, James Bralla

REFERENCE:
1. ASM Hand book Vol.20

Course outcomes:
Upon completion of the course, the student will be able to:
1. Design components for machining.
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints.
4. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms.
5. Design plastic components for machining and joining and selecting a proper processes for different joining cases.
AUTOMATION IN MANUFACTURING
(DEPARTMENTAL ELECTIVE – II)

Course objective:
1. To study the types and strategies and various components in Automated Systems.
2. To understand the automated flow lines, line balancing, material storage and retrieval and inspection.

UNIT-I
INTRODUCTION: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing and machine tool control.

UNIT – II
AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, buffer storage, control function, design and fabrication considerations.
Analysis of automated flow lines - General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – III
ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV
AUTOMATED MATERIAL HANDLING and STORAGE SYSTEMS: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – V
ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints, application of adaptive control in machining operations. Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.
UNIT – VI
AUTOMATED INSPECTION: Fundamentals, types of inspection methods and equipment, Coordinate Measuring Machines, Machine Vision.

TEXT BOOK:
1. Automation, Production Systems and Computer Integrated Manufacturing : M.P. Groover./ PE/PHI.

REFERENCES:
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

Course outcomes:
Upon successful completion of this course student should be able to:
Solve the line balancing problems in the various flow line systems with and without use buffer storage.
Understand the different automated material handling, storage and retrieval systems and automated inspection systems.
Use of Adaptive Control principles and implement the same online inspection and control.
INDUSTRIAL HYDRAULICS & PNEUMATICS
(DEPARTMENTAL ELECTIVE – II)

Course objective
1. Understand the underlying principles of Industrial Hydraulics & Pneumatic System.
2. Analyze circuits and Enumerate the functions & characteristics of circuit elements.
3. Attend to troubleshooting in fluid power systems.
4. identify and describe the basic operation of Hydraulic / Pneumatic systems, the various equipment used in their operation.

UNIT – I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
Pneumatic systems-Introduction-symbols used-concepts & components-comparision-types & specifications of compressors-arrangement of a
complete pneumatic system-compressed air behaviour- understanding pneumatic circuits-direction control valves.

Electro pneumatics- Introduction-Pilot operated solenoid valve-electrical connections to solenoids-electro pneumatic circuit switches-relays-solenoids-P.E converter-concept of latching.

UNIT-VI

TEXT BOOKS:
1. Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI, New Delhi.

REFERENCE BOOKS:

Course outcome:
Upon successful completion of this course student should be able to:
1. understand the general concepts associated with Hydraulic and Pneumatic equipment as found in industry today.
2. The course describes the various types of Hydraulic / Pneumatic equipment as well as the different types of Seals used in such equipment.
3. Understand advantage of fluid power, it provides examples of applications.
4. Understand the operation of hydraulics & pneumatics circuits and components typically used in industry.
IV Year – I SEMESTER

SIMULATION LAB

Course Objectives:

1. To impart the fundamental knowledge on using various analytical tools like ANSYS, FLUENT, etc., for Engineering Simulation.
2. To know various fields of engineering where these tools can be effectively used to improve the output of a product.
3. To impart knowledge on how these tools are used in Industries by solving some real time problems using these tools.

1. DRAFTING: Development of part drawings for various components in the form of orthographic and isometric representation of dimensioning and tolerances scanning and plotting. Study of script, DXE and IGES files.


3. a) Determination of deflection and stresses in 2D and 3D trusses and beams.
   b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   e) Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a) Development of process sheets for various components based on tooling Machines.
   b) Development of manufacturing and tool management systems.
   c) Study of various post processors used in NC Machines.
   d) Development of NC code for free form and sculptured surfaces using CAM packages.

f) Quality Control and inspection.

Packages to be provided to cater to drafting, modeling & analysis from the following:
Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Course outcomes:
Upon successful completion of this course student should be able to:

1. The student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems.

2. Use of these tools for any engineering and real time applications.

3. Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their employment.
Objective:
To develop the ability to conceptualize a product, apply standard/innovative design techniques and realize the product through fabrication with focus on design-manufacturing integration.

Course content:
Identification of possible improvements in an existing product, conceptualization of a new product/part, design of the part using design methodologies, selection of material(s), preparation of process flow chart for manufacturing, fabrication of the part using the available in-house facilities, assembly, testing of the functionality of the product.
The students should come up with their own original and innovative ideas for product design. The task may be performed by student teams/groups.

Course Outcome:
Through this course the student is expected to learn realization of a product, conceptualized and designed by him. The student gets hand on experience of the entire chain of manufacturing steps with an understanding of design-manufacturing integration.
Course objectives:
This subject provides students with

1. An understanding of the concepts of production and service systems;
2. The ability to apply principles and techniques in the design, planning and control of these systems to optimise/make best use of resources in achieving their objectives.
3. Identify different strategies employed in manufacturing and service industries to plan production and control inventory.
4. Measure the effectiveness, identify likely areas for improvement, develop and implement improved planning and control methods for production systems.

UNIT – I

UNIT – II
Forecasting – importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitative methods.

UNIT – III
Introduction to MRP I, MRP II, ERP, LOB (Line of Balance), JIT and KANBAN system.

UNIT – IV
UNIT – V
Scheduling policies – techniques, standard scheduling methods.
Line Balancing, aggregate planning, chase planning, expediting, controlling aspects.

UNIT – VI
Dispatching – activities of dispatcher – dispatching procedure – follow up –
definition – reason for existence of functions – types of follow up, applications of computer in production planning and control.

TEXT BOOKS:
1. Elements of Production Planning and Control / Samuel Eilon.

REFERENCES:
1. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
2. Production Planning and Control, Mukhopadyay, PHI.
4. Production Control / Moore.

Course outcome:
Upon completion of the subject, students will be able to
1. Apply the systems concept for the design of production and service systems.
2. Make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques.
3. Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.
4. Understand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances.
Course Objective:
The course aims to highlight the significance of alternative sources of energy, green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

UNIT-I
INTRODUCTION:
SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II
SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

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

UNIT –IV
ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V
ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

UNIT – VI

TEXT BOOKS:


REFERENCES:

4. Renewable Energy Technologies / Ramesh & Kumar / Narosa
5. Renewable Energy Technologies / G.D Roy

**Course outcome:**
The student shall understand the principles and working of solar, wind, biomass, geo thermal, ocean energies and green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.
EXPERIMENTAL STRESS ANALYSIS

Course objectives:
Objective of the course is to measure strain through various experimental methods like strain gauges, photo elasticity techniques, brittle coatings, moiré methods and birefrigerent coatings to understand the relation between the mechanics theory and experimental stress analysis to learn usage of the experimental techniques on the practical problems.

UNIT – I
Introduction: Stress, strain, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, Three-dimensional stress strain relations.

UNIT – II
Strain Measurement and Recordings: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits. Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT – III
Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

Three dimensional Photo elasticity: Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

UNIT – IV
Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin
based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

UNIT – V
Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT – VI
Birefringent Coatings
Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS :
1. Theory of Elasticity by Timoshenke and Goodier Jr.
2. Experimental stress analysis by Dally and Riley, Mc Graw-Hill.

REFERENCES:
1. A treatise on Mathematical theory of Elasticity by LOVE .A.H.
2. Photo Elasticity by Frocht.
3. Experimental stress analysis, Video course by K.Ramesh / NPTEL.

Course Outcomes:
The intended learning outcomes are that on completion of this course the student should be able to:
1. Student should be able to chose the appropriate method for measuring strain.
2. Students should be able to apply optical techniques for measurement of strain & stress.
3. Analyze the results obtained from coating techniques and corroborated with theoretical results.
4. Correlate experimental and analytically derived results.
MECHATRONICS
(DEPARTMENTAL ELECTIVE – III)

Course Objective
The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the different components and devices of mechatronics systems.

UNIT-I
Mechatronics systems – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II
Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-III

UNIT-IV
Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V
System and interfacing and data acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.
UNIT -VI

TEXT BOOK:

REFERENCES:
5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

Course outcomes:
After completion of this course, the student shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.
ADVANCED MATERIALS
(DEPARTMENTAL ELECTIVE – III)

Course Objectives
The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behavior, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

UNIT-I
REINFORCEMENTS: Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and boron carbide fibres.

UNIT-II
polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

UNIT-III
MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV
MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized hooke’s law, reduction of hooke’s law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

UNIT-V
FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials-classification-different systems-preparation-properties and applications of functionally graded materials.
SHAPE MEMORY ALLOYS: Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.
UNIT-VI

NANO MATERIALS: Introduction-properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (nano – structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.

TEXT BOOKS:
2. Material science and Technology- Cahan.

REFERENCES:

Course outcomes
Students who successfully complete this course will demonstrate the following:
- Properties of constituents, classification of composites and their suitability for the structural applications.
- Manufacturing processes.
- Smart materials and their applications.
- Nano materials in comparison with bulk materials.
POWER PLANT ENGINEERING
(DEPARTMENTAL ELECTIVE – III)

Course Objectives:
The course is aimed at providing knowledge of power generation through
different prime movers viz steam, ICGT, Hydro, nuclear and hybrid systems
along with their economics and environmental considerations.

UNIT – I
Introduction to the sources of energy – resources and development of power
in india.

STEAM POWER PLANT: Plant layout, working of different circuits, fuel
and handling equipments, types of coals, coal handling, choice of handling
equipment, coal storage, ash handling systems. Combustion: properties of
coa – overfeed and underfeed fuel beds, traveling grate stokers, spreader
stokers, retort stokers, pulverized fuel burning system and its components,
combustion needs and draught system, cyclone furnace, design and
construction, dust collectors, cooling towers and heat rejection. corrosion and
feed water treatment.

UNIT – II
INTERNAL COMBUSTION AND GAS TURBINE POWER PLANTS:
DIESEL POWER PLANT: Plant layout with auxiliaries – fuel supply
system, air starting equipment, super charging.

GAS TURBINE PLANT: Introduction – classification - construction –
layout with auxiliaries, combined cycle power plants and comparison.

UNIT – III
HYDRO ELECTRIC POWER PLANT: Water power – hydrological cycle
/ flow measurement – drainage area characteristics – hydrographs – storage
and pondage – classification of dams and spill ways.

HYDRO PROJECTS AND PLANT: Classification – typical layouts –
plant auxiliaries – plant operation pumped storage plants.

UNIT – IV
NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile
materials – nuclear reactor – reactor operation.

TYPES OF REACTORS: Pressurized water reactor, boiling water reactor,
sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gas
cooled reactor, radiation hazards and shielding – radioactive waste disposal.
UNIT – V

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS:
Introduction, advantages of combined working, load division between power stations, storage type hydro-electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydro-electric and gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O₂ and CO₂ measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

UNIT – VI

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

TEXT BOOKS:
1. A course in Power Plant Engineering – Arora and Domkundwar, Dhanpatrai & Co.

REFERENCES:

Course outcomes:
After undergoing this course the student can understand various conventional methods of power generation and principle of operation and performance of respective prime movers along with their economics and their impact on environment.
IV Year – II SEMESTER  

3+1*  0  3

DEPARTMENTAL ELECTIVE – IV  

NON - DESTRUCTIVE EVALUATION

Course Objectives

- The students are to be exposed to the concepts of various NDE techniques using radiography, ultrasonics, liquid penetrates, magnetic patches and Eddy currents.
- They will learn basic principles of these methods and will be able to select a testing process.
- They will understand the advantages and disadvantages of these techniques.

UNIT – I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography

UNIT – II


UNIT – III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing

UNIT – IV

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials , Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.
UNIT – V

**Eddy Current Test:** Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing

UNIT – VI

**Industrial Applications of NDE:** Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

**TEXT BOOKS:**

2. Ultrasonic testing by Krautkramer and Krautkramer.
3. Non-destructive testing, Warress, JMc Gonmade.

**REFERENCES:**

1. Ultrasonic inspection training for NDT: E. A. Gingel, Prometheus Press.
2. ASTM Standards, Vol 3.01, Metals and alloys.

**Course Outcomes**

1. Comprehensive, theory based understanding of the techniques and methods of non destructive testing.
2. Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.
ADVANCED OPTIMIZATION TECHNIQUES
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:
To enable the students learn the latest non-linear optimization techniques such as classical optimization methods, dynamic programming, integer programming etc. Provide basic knowledge and enough competence to formulate the optimization problems.

UNIT I
INTRODUCTION TO OPTIMIZATION: Engineering applications of optimization- statement of an optimization problem- classification of optimization problem- optimization techniques.
CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization- multivariable optimization with equality constraints- multivariable optimization with inequality constraints.

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
DYNAMIC PROGRAMMING (D.P): Multistage decision processes. concepts of sub optimization, computational procedure in dynamic programming calculus method and tabular methods. Linear programming as a case of D.P., Continuous D.P.
UNIT-VI


TEXT BOOK:


REFERENCES:


Course Out comes:

1. Students at the end of the course learn advanced optimization techniques to show real-life problems.
2. Students can able to formulate and solve various practical optimization problems in manufacturing and service organizations.
GAS DYNAMICS AND JET PROPULSION  
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:
The purpose of this course is to provide the student with the knowledge of basic principles of gas dynamics and its importance in jet propulsion applications.

UNIT-I
Introduction to gas dynamics: control volume and system approaches acoustic waves and sonic velocity - mach number - classification of fluid flow based on mach number - mach cone-compressibility factor - general features of one dimensional flow of a compressible fluid - continuity and momentum equations for a control volume.

UNIT-II
Isentropic flow of an ideal gas: basic equation - stagnation enthalpy, temperature, pressure and density-stagnation, acoustic speed - critical speed of sound- dimensionless velocity-governing equations for isentropic flow of a perfect gas - critical flow area - stream thrust and impulse function.
Steady one dimensional isentropic flow with area change-effect of area change on flow parameters- chocking- convergent nozzle - performance of a nozzle under decreasing back pressure -De lavel nozzle - optimum area ratio effect of back pressure - nozzle discharge coefficients - nozzle efficiencies.

UNIT- III
Simple frictional flow: adiabatic flow with friction in a constant area duct-governing equations - fanno line limiting conditions - effect of wall friction on flow properties in an Isothermal flow with friction in a constant area duct-governing equations - limiting conditions.
Steady one dimensional flow with heat transfer in constant area ducts-governing equations - Rayleigh line entropy change caused by heat transfer - conditions of maximum enthalpy and entropy.

UNIT-IV
UNIT- V
Propulsion: Air craft propulsion: - types of jet engines - energy flow through jet engines, thrust, thrust power and propulsive efficiency turbojet components-diffuser, compressor, combustion chamber, turbines, exhaust systems.

UNIT-VI

TEXT BOOKS:

REFERENCES
2. Aircraft & Missile propulsion - Zucrow.

Course outcomes:
Up on successful completion of this course the student should be able to analyze the gas flow in different situations with and without friction, with and without heat transfer in particular jet propulsion and rocket engineering applications.
QUALITY AND RELIABILITY ENGINEERING
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:
1. The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product quality and reliability.
2. The objectives are to introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring.
3. To understand techniques of modern reliability engineering tools.

UNIT-I
Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design, quality costs – quality improvement.

UNIT-II
Statistical process control $\bar{X}$, R, p, c charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination).

UNIT-III
Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plans.

UNIT-IV
Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types, online quality control – variable characteristics, attribute characteristics, parameter design.
Quality function deployment – house of quality, QFD matrix, total quality management concepts, quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-V
Reliability – Evaluation of design by tests - Hazard Models, Linear, Releigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.
UNIT-VI
Complex system, reliability, reliability of series, parallel & standby systems & complex systems & reliability prediction and system effectiveness. Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.

TEXT BOOKS:

REFERENCE BOOKS:

Course outcome:
Upon successful completion of this course, students should be able to:
1. Understand quality and reliability concept, beware of some basic techniques for quality improvement, and acquire fundamental knowledge of statistics and probability.
2. Apply control charts to analyze and improve the process quality.
3. Design a simple sampling plan, construct its OC curve and evaluate its effectiveness on a given sampling process.
4. Acquire the concepts of the reliability, and calculate the system reliability based on the given component connection; calculate the reliability based on the given failure model.
Objectives:
The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

Outcomes:
After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:
The student should work in groups to achieve the aforementioned objectives and the outcomes.
COURSE STRUCTURE AND SYLLABUS

For

CIVIL ENGINEERING

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
### I Year - I Semester

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**Total Credits** 24

### I Year - II Semester

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**Total Course Credits** = 48+44 + 42 + 46 = 180
SYLLABUS

I Year - I Semester

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(Common to All Branches)

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.
Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports—are to be tested along with appropriate language and expressions.
4. Examinations:
   - Mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   (80% for the best of two and 20% for the other)
   - Assignments= 5%
   - End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK:

ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

NON-DETAILED TEXTBOOK:

PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

OBJECTIVE:
To develop human resources to serve the society in different ways.

OUTCOME:
The lesson motivates the readers to develop their knowledge in different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

UNIT 2:

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

**OBJECTIVE:**
To highlight road safety measures whatever be the mode of transport.

**OUTCOME:**
The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama: A Course on Reading'

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

UNIT 3:

1. 'Evaluating Technology' from English for Engineers and Technologists.

**OBJECTIVE:**
To highlight the advantages and disadvantages of technology.

**OUTCOME:**
The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama: A Course on Reading'

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

UNIT 4:

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

**OBJECTIVE:**
To bring into focus different sources of energy as alternatives to the depleting sources.

**OUTCOME:**
The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama: A Course on Reading

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the fact that animals must be preserved because animal life is precious.

OUTCOME:
The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 6:
1. 'Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

OUTCOME:
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.
MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:

1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}, \sin ax, \cos ax, \text{polynomials in } x, e^{ax} V(x), xV(x)$- Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT III: 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 (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:
Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule- Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).
UNIT V: First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions —solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{axy}, \sin(\alpha x + \beta y), \cos(\alpha x + \beta y), x^m y^n$. Classification of second order partial differential equations.

Text Books:

Reference Books:
3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

**Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace and automotive industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
- Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced. Also lubrication is introduced.

**UNIT I: HIGH POLYMERS AND PLASTICS**

*Polymerisation:* Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties –

*Plastics* as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

*Elastomers:*- Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.


**UNIT II: FUEL TECHNOLOGY**

Explosives: - Rocket fuels

UNIT III: ELECTROCHEMICAL CELLS AND CORROSION
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion :- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

Liquid crystals:- Introduction – Types – Applications

Super conductors:-Type I, Type II – Characteristics and applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples – R₄M₄ principles

UNIT V: WATER TECHNOLOGY

UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS
Refractories: - Definition, characteristics, classification, properties, failure of refractories

Lubricants: - Definition, function, Theory and mechanism of lubricants, properties (Definition and importance)

Cement: - Constituents, manufacturing, hardening and setting, deterioration of cement

Insulators: - Thermal and electrical insulators

Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells

Outcome: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations
of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.

**Standard Books:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

**Reference Books:**

5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.


Friction: Introduction, limiting friction and impending motion, coulomb’s laws of dry friction, coefficient of friction, cone of friction

UNIT II

Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.


UNIT – III

Objectives: The students are to be exposed to concepts of centre of gravity.

Centroid: Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.
UNIT IV

Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion


REFERENCES:

Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT-III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

UNIT-IV
Modular Programming: Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local
Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:
Arrays & Strings
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays - Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:
Pointers, Structures, Files
Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.
Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.
Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
• Understand the basic terminology used in computer programming
• Write, compile and debug programs in C language.
• Use different data types in a computer program.
• Design programs involving decision structures, loops and functions.
• Explain the difference between call by value and call by reference
• Understand the dynamics of memory by the use of pointers
• Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, Reema Thareja, OXFORD.
Course Learning Objectives:
The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food
chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.


UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e– waste management.


The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:
1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

Reference:
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na$_2$CO$_3$ solution.

3. Determination of alkalinity of a sample containing Na$_2$CO$_3$ and NaOH.

4. Determination of KMnO$_4$ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K$_2$Cr$_2$O$_7$ solution.

6. Determination of Copper using standard K$_2$Cr$_2$O$_7$ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
Reference Books
PREScribed LAB manual for SEMester I:

'INTERACT': English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. WHY study Spoken English?
   2. Making Inquiries on the phone, thanking and responding to Thanks Practice work.

UNIT 2:

1. Responding to Requests and asking for Directions Practice work.

UNIT 3:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
   2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

UNIT 4:

1. Letters and Sounds Practice work.

UNIT 5:

1. The Sounds of English Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation

Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.

2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
<td></td>
<td></td>
<td>Grammar</td>
<td>Vocabulary &amp; expression</td>
<td></td>
</tr>
</tbody>
</table>

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording).
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVES:
• Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures an File programming.

• Acquire knowledge about the basic concept of writing a program.

• Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

• Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

• Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.
Understand the difference between the above two programs

Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
Exercise - 13 Files  
a) Write a C programming code to open a file and to print its contents on screen.  
b) Write a C program to copy files  

Exercise - 14 Files Continue  
a) Write a C program merges two files and stores their contents in another file.  
b) Write a C program to delete a file.  

OUTCOMES:  

• Apply and practice logical ability to solve the problems.  

• Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment  

• Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs  

• Understand and apply the in-built functions and customized functions for solving the problems.  

• Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.  

• Document and present the algorithms, flowcharts and programs in form of user-manuals  

• Identification of various computer components, Installation of software  

Note:  

a) All the Programs must be executed in the Linux Environment. (Mandatory)  
b) The Lab record must be a print of the LATEX (.tex) Format.
Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.
SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports—are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   (80% for the best of two and 20% for the other)
   Assignments= 5%
   End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.
6. The following text books are recommended for study in I B.Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cengage learning

The course content along with the study material is divided into six units.

UNIT 1:
1. 'The Greatest Resource- Education’ from English Encounters

OBJECTIVE:
Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

**OUTCOME:**

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

**OBJECTIVE:**

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

**OUTCOME:**

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

**UNIT 2:**

1. 'A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

**OBJECTIVE:**

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

**OUTCOME:**

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

**UNIT 3:**

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

**OBJECTIVE:**

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.
OUTCOME:
The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

OUTCOME:
The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.

OBJECTIVE:
The lesson highlights insightful commentary on cultural traditions.

OUTCOME:
The theme projects society's need to re-examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

OBJECTIVE:
The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

UNIT 5:
1. 'The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:
The essay presents several health disorders that spring out due to environmental changes

OUTCOME:
The lesson offers several inputs to protect environment for the sustainability of the future generations.
2. 'Prafulla Chandra Ray' from The Great Indian Scientists.

OBJECTIVE:
The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:
Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:
1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:
The lesson supports the developments of technology for the betterment of human life.

OUTCOME:
Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:
The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.
MODEL QUESTION PAPER FOR THEORY

PART- I
Six short answer questions on 6 unit themes
One question on eliciting student's response to any of the themes

PART- II
Each question should be from one unit and the last question can be a combination of two or more units. Each question should have 3 sub questions: A, B & C
A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

UNIT IV: Fourier Series:
Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet’s conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V: Applications of PDE:
Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

UNIT VI: Fourier Transforms:
Text Books:


Reference Books:

1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

UNIT II: Eigen values - Eigen vectors and Quadratic forms:
Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:
Curve tracing: Cartesian, Polar and Parametric forms.
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.

UNIT IV: Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Applications: Evaluation of integrals.

UNIT V: Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators - Vector identities.
Applications: Equation of continuity, potential surfaces.
UNIT VI: Vector Integration:
Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.
Applications: Work done, Force.

Text Books:

Reference Books:
OBJECTIVES: Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart concepts of Optical Interference, Diffraction and Polarization required to design instruments with higher resolution - Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the Structure-property relationship exhibited by solid crystal materials for their utility.
- Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.
- To explore the Nuclear Power as a reliable source required to run industries
- To impart the knowledge of materials with characteristic utility in appliances.

UNIT-I
INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II
DIFFRACTION: Fraunhofer diffraction at single slit cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III
POLARIZATION: Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter)

UNIT-IV
ACOUSTICS: Reverberation time - Sabine’s formula – Acoustics of concert-hall.
ULTRASONICS: Production - Ultrasonic transducers- Non-Destructive Testing Applications.

UNIT-V
CRYSTALLOGRAPHY & X-RAY DIFFRACTION: Basis and lattice – Bravais systems- Symmetry elements- Unit cell- packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes – Bragg’s law.

UNIT-VI
MAGNETISM: Classification based on Field, Temperature and order/disorder – atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para & Ferro).

Outcome: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.

Text Books:

Reference books:
2. Lasers and Non-Linear optics by B.B.Laud, Newage international publishers (2008)
Learning Objectives: The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamental principles of materials, fuels, Steam, I.C. Engines, compressors, hydraulic machines and transmission systems that usually exist in any process plant.

UNIT –I:
Stresses and strains: kinds of – stress-strains, elasticity and plasticity, Hooks law, stress – strain diagrams, modules of elasticity, Poisson’s ratio, linear and volumetric strain, relation between E, N, and K, bars of uniform strength, compound bars and temperature stresses.

UNIT– II:
Types of supports – loads – Shear force and bending moment for cantilever and simply supported beams without overhanging for all types of loads.

Theory of simple bending, simple bending formula, Distribution of Flexural and Shear stress in Beam section – Shear stress formula – Shear stress distribution for some standard sections

UNIT-III:
Thin cylindrical shells: stress in cylindrical shells due to internal pressures, circumferential stress, longitudinal stress, design of thin cylindrical shells, spherical shells, change in dimension of the shell due to internal pressure, change in volume of the shell due to internal pressure.

Thick Cylinders: Lame’s equation- cylinders subjected to inside and outside pressures columns and Struts.
UNIT-IV:
Steam boilers and Reciprocating air compressors: Classification of boilers, essentialities of boilers, selection of different types of boilers, study of boilers, boiler mountings and accessories.

Reciprocating air compressors: uses of compressed air, work done in single stage and two-stage compression, inter cooling and simple problems.

UNIT-V:
Internal combustion engines: classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT-VI:
Transmission systems: Belts – Ropes and chain: belt and rope drives, velocity ratio, slip, length of belt, open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound –reverted and epicyclic gear trains.

Outcomes: After completing the course, the student shall be able to determine:

- The stress/strain of a mechanical component subjected to loading.
- The performance of components like Boiler, I.C. Engine, Compressor, Steam/Hydraulic turbine, Belt, Rope and Gear.
- The type of mechanical component suitable for the required power transmission.

Text Books:


Reference Book:

Learning Objectives:

- Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT-I:

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT-II:

Objective: To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP, VP or PP)

UNIT-III:

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

UNIT-IV:

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
UNIT-V:

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-VI:

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**Text Books:**

**Reference Books:**
I Year - II Semester

ENGLISH – COMMUNICATION SKILLS
LAB – II

L T P C
0 0 3 2

PRESCRIBED LAB MANUAL FOR SEMESTER II:
'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:
To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.
The course content along with the study material is divided into six units.

UNIT 1:
1. Debating
   Practice work

UNIT 2:
1. Group Discussions
   Practice work

UNIT 3:
1. Presentation Skills
   Practice work

UNIT 4:
1. Interview Skills
   Practice work

UNIT 5:
1. Email,
2. Curriculum Vitae
   Practice work

UNIT 6:
1. Idiomatic Expressions
2. Common Errors in English
   Practice work
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a technical mini-project experimental report with scientific temper.
**I Year  - II Semester**

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**ENGINEERING WORKSHOP & IT WORKSHOP**

**ENGINEERING WORKSHOP:**

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

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

**Trade:**

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

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

- **Black Smithy**
  1. Round rod to Square
  2. S-Hook
  3. Round Rod to Flat Ring
  4. Round Rod to Square headed bolt

- **House Wiring**
  1. Parallel / Series Connection of three bulbs
  2. Stair Case wiring
  3. Florescent Lamp Fitting
  4. Measurement of Earth Resistance

- **Tin Smithy**
  1. Taper Tray
  2. Square Box without lid
  3. Open Scoop
  4. Funnel
IT WORKSHOP:
OBJECTIVES:

- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device

   Drivers.

3. MS-Office / Open Office

   b. Spread Sheet - organize data, usage of formula, graphs, charts.
   c. Power point - features of power point, guidelines for preparing an effective presentation.
   d. Access- creation of database, validate data.


5. Internet and World Wide Web-Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. MATLAB- basic commands, subroutines, graph plotting.

8. LATEX-basic formatting, handling equations and images.

OUTCOMES:

- Common understanding of concepts, patterns of decentralization implementation in Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels
TEXT BOOKS:

5. Scott Mueller’s Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
Course Objectives: To acquaint students with the fundamental concepts of probability and statistics and to develop an understanding of the role of statistics in engineering. Also to introduce numerical techniques to solve the real world applications.

Course Outcomes: At the end of the Course, Student will be able to:
1. Examine, analyze, and compare various Probability distributions for both discrete and continuous random variables.
2. Describe and compute confidence intervals for the mean of a population.
3. Describe and compute confidence intervals for the proportion and the variance of a population and test the hypothesis concerning mean, proportion and variance and perform ANOVA test.
4. Fit a curve to the numerical data.

UNIT I: Discrete Random variables and Distributions:
Introduction-Random variables- Discrete Random variable-Distribution function- Expectation-Moment Generating function-Moments and properties.
Discrete distributions: Binomial, Poisson and Geometric distributions and their fitting to data.

UNIT II: Continuous Random variable and distributions:
Introduction-Continuous Random variable-Distribution function- Expectation-Moment Generating function-Moments and properties.
Continuous distribution: Uniform, Exponential and Normal distributions, Normal approximation to Binomial distribution -Weibull, Gamma distribution.

UNIT III: Sampling Theory:
Introduction - Population and samples- Sampling distribution of means ($\sigma$ known)-Central limit theorem- t-distribution- Sampling distribution of means ($\sigma$ unknown)- Sampling distribution of variances -$\chi^2$ and F-distributions- Point estimation- Maximum error of estimate - Interval estimation.

UNIT IV: Tests of Hypothesis:
Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences- ANOVA for one-way and two-way classified data.

UNIT V: Curve fitting and Correlation:
Introduction - Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares-Goodness of fit.
Correlation and Regression – Properties.
UNIT VI: Statistical Quality Control Methods:

Text Books:


Reference Books:

2. William Menden Hall, Robert J. Bever and Barbara Bever, Introduction to probability and statistics, Cengage learning, 2009
Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

- To learn the basic principles of electrical law’s and analysis of networks.
- To understand the principle of operation and construction details of DC machines.
- To understand the principle of operation and construction details of transformer.
- To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
- To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPS.
- To learn the operation of PNP and NPN transistors and various amplifiers.

Outcomes:

- Able to analyse the various electrical networks.
- Able to understand the operation of DC generators, 3-point starter and conduct the Swinburne’s Test.
- Able to analyse the performance of transformer.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to analyse the operation of half wave, full wave rectifiers and OP-AMPS.
- Able to explain the single stage CE amplifier and concept of feedback amplifier.

UNIT – I, ELECTRICAL CIRCUITS:
Basic definitions, Types of network elements, Ohm’s Law, Kirchhoff’s Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT – II, DC MACHINES:
Principle of operation of DC generator – emf equation - types – DC motor types – torque equation – applications – three point starter, swinburne’s Test, speed control methods.

UNIT – III, TRANSFORMERS:
Principle of operation of single phase transformers – e.m.f equation – losses – efficiency and regulation.

UNIT V, RECTIFIERS & LINEAR ICs: PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs(inverting, non inverting, integrator and differentiator).

UNIT VI, TRANSISTORS: PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

TEXT BOOKS:
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group

REFERENCES:
1. Basic Electrical Engineering, M. S. Naidu and S. Kamakshiah, TMH Publications
4. Industrial Electronics, G. K. Mittal, PHI
Course Learning Objectives:

- To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
- To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
- The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
- To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

- The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.
- The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
- The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions.
- The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame’s equation.

SYLLABUS:

UNIT – II: Shear Force And Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.


UNIT – IV: Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.


TEXT BOOKS:
2. Strength of Materials by S. Ramamrutham,

REFERENCES:
I. Objectives of the course:

- Initiating the student with the knowledge of basic building materials and their properties.
- Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
- The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
- Imparting the students with the techniques of formwork and scaffolding.
- The students should be exposed to classification of aggregates, moisture content of the aggregate.

II. Course outcome:

Upon the successful completion of the course:

- The student should be able to identify different building materials and their importance in building construction.
- The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
- The student should have learnt the importance of building components and finishings.
- The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

UNIT I: Stones, Bricks And Tiles


UNIT II Masonry


UNIT IV: Building Components Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.


UNIT VI: Aggegates Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Text Books:

References:
4. Building construction, P. C. Verghese, PHI Learning (P) Ltd.

***
II Year - I Semester

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SURVEYING

Course Learning Objectives:
To introduce the students to basic principles of surveying, various methods of linear and angles measuring instruments and enable the students to use surveying equipments.

Course Outcomes:
Upon successful completion of the course, the student will be able:

- To demonstrate the basic surveying skills
- To use various surveying instruments.
- To perform different methods of surveying
- To compute various data required for various methods of surveying.
- To integrate the knowledge and produce topographical map.

Syllabus:

UNIT – I, Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II Distances And Direction: Electronic distance measurements (EDM)- principles of electro optical EDM-Errors and corrections to linear measurements- Compass survey-Meridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements


Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.
UNIT – V Curves: Types of curves, design and setting out – simple and compound curves - Introduction to geodetic surveying, Total Station and Global positioning system

UNIT – VI Computation Of Areas And Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text Books:
4. Surveying and levelling, R. Subramanian, Oxford University press.

References:
3. Higher Surveying, A.M. Chandra, New Age International Pvt Ltd.
II Year - I Semester

FLUID MECHANICS

Course Learning Objectives:

- To understand the properties of fluids and fluid statics
- To derive the equation of conservation of mass and its application
- To solve kinematic problems such as finding particle paths and stream lines
- To use important concepts of continuity equation, Bernoulli’s equation and turbulence, and apply the same to problems
- To analyze laminar and turbulent flows
- To understand the various flow measuring devices
- To study in detail about boundary layers theory

Course Outcomes:

Upon successful completion of this course the students will be able to:

- Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
- Calculate the forces that act on submerged planes and curves.
- Identify and analyse various types of fluid flows.
- Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
- Draw simple hydraulic and energy gradient lines.
- Measure the quantities of fluid flowing in pipes, tanks and channels.

Syllabus:

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

UNIT II Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.
UNIT – III Fluid Dynamics: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.


Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold’s number – Moody’s Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method,


UNIT – VI Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers(no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:

References:
1. Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, CENGAGE Learning

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List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed circuit)
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse)
5. Plane table survey; finding the area of a given boundary by the method of Radiation
6. Plane table survey; finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling : Height of the instrument method (differential levelling)
11. Fly levelling; Longitudinal Section and Cross sections of a given road profile.

Note: Any 10 field work assignments must be completed.

***
List of Experiments

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell’s / Rock well’s hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell’s theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges
Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

Outcome:

*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.


UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:
UNIT V: Engineers’ Duties and Rights:

UNIT VI: Global Issues:

References:

4. Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
9. Human Values And Professional Ethics, Jayshree Suresh and B. S. Raghavan, S.Chand Publications
Objectives of the course:

- Initiating the student to different building bye-laws and regulations.
- Imparting the planning aspects of residential buildings and public buildings.
- Giving training exercises on various signs and bonds and different building units.
- Imparting the skills and methods of planning of various buildings.

Course outcome:

- Upon successful completion of the course:
  - Student should be able to plan various buildings as per the building by-laws.
  - The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
  - The student is expected to learn the skills of drawing building elements and plan the buildings as per requirements.

UNIT I: Building Byelaws and Regulations
Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT II: Residential Buildings
Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types of residential buildings and relationship between plan, elevation and forms and functions

UNIT III: Public Buildings
Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels and motels, buildings for recreation, Landscaping requirements.

UNIT IV: Sign Conventions And Bonds
Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.
English bond and Flemish bond - odd and even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

UNIT V: Doors, Windows, Ventilators And Roofs
Panelled door, panelled and glazed door, glazed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs.
King Post truss, Queen Post truss
Sloped and flat roof and buildings: drawing plans, Elevations and Cross Sections of given sloped and flat roof buildings.
UNIT VI: Planning And Designing Of Buildings.
Draw the Plan, Elevation and Sections of a Residential and Public buildings from the given line diagram.

Text Books:
1. Planning, designing and Scheduling, Gurucharan Singh and Jagadish Singh
2. Building planning and drawing by M. Chakravarthi.
3. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur,

References:
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.

INTERNAL EXAMINATION PATTERN:
The total internal marks (30) are distributed in two components as follows:
1. Descriptive (subjective type) Weightage 60% examination:18 marks
2. Drawing Assignment : 12 marks

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part A is 60% and Part B is 40%. 
Course Learning Objectives:

- To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories.
- To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
- To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures.
- Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.
- Impart concepts for determination of Forces in members of plane pin-jointed perfect trusses by different methods.

Course Outcomes:

Upon successful completion of this course,

- The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
- The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions.
- The student will be able to assess forces in different types of trusses used in construction.

SYLLABUS:

UNIT- I Principal Stresses And Strains And Theories Of Failures: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.


Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.


Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT – IV Direct And Bending Stresses: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.


UNIT – VI Analysis Of Pin-Jointed Plane Frames: Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.
Text Books:
2. Strength of materials by R. K Rajput, S.Chand and Co.

References:
Course Learning Objectives:

- To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump
- To introduce dimensional analysis for fluid flow problems
- To understand the working principles of various types of hydraulic machines and Pumps.

Course Outcomes:

Upon successful completion of this course the students will be able to:

- Solve uniform and non-uniform open channel flow problems.
- Apply the principals of dimensional analysis and similitude in hydraulic model testing.
- Understand the working principles of various hydraulic machineries and pumps.

Syllabus:

UNIT – I UNIFORM FLOW IN OPEN CHANNELS:
Types of channels – Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy’s, and Manning’s formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth


UNIT – III HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.


RECIPROCATING PUMPS: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Text Books:

References:
1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS
Course Learning Objectives:

- To learn the concepts of Concrete production and its behaviour in various environments.
- To learn the test procedures for the determination of properties of concrete.
- To understand durability properties of concrete in various environments.

Course Outcomes:

Upon successful completion of this course, student will be able to

- understand the basic concepts of concrete.
- realize the importance of quality of concrete.
- familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
- test the fresh concrete properties and the hardened concrete properties.
- evaluate the ingredients of concrete through lab test results. design the concrete mix by BIS method.
- familiarize the basic concepts of special concrete and their production and applications. understand the behaviour of concrete in various environments.

SYLLABUS:


Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water,


Text Books:
1. Concrete Technology, M. S. Shetty. – S. Chand & Company
2. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

References:
Course Learning Objectives:

- To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions
- The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
- The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.

Course Outcomes:

Upon successful completion of this course the student will be able to,

- Distinguish between the determinate and indeterminate structures.
- Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
- Estimate the bending moment and shear forces in beams for different fixity conditions.
- Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
- Draw the influence line diagrams for various types of moving loads on beams/bridges.
- Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.

Syllabus:

UNIT – I Propped Cantilevers: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II Fixed Beams – Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.
UNIT – III Continuous Beams: Introduction-Clapeyron’s theorem of three moments-
Analysis of continuous beams with constant moment of inertia with one or both ends fixed-
continuous beams with overhang, continuous beams with different moment of inertia for
different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV Slope-Deflection Method: Introduction, derivation of slope deflection equation,
application to continuous beams with and without settlement of supports.

UNIT – V Energy Theorems: Introduction-Strain energy in linear elastic system, expression
of strain energy due to axial load, bending moment and shear forces - Castigliano’s first
theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI Moving Loads And Influence Lines: Introduction maximum SF and BM at a
given section and absolute maximum S.F. and B.M due to single concentrated load, U. D
load longer than the span, U. D load shorter than the span, two point loads with fixed distance
between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load
position for maximum SF at a section-Load position for maximum BM at a sections, single
point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines
for forces in members of Pratt and Warren trusses.

Text Books:

2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
   Publishers, New Delhi

References:

5. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli,
   Yesdee Publishing Pvt Limited, Chennai
Course Learning Objectives:
The objectives of this course are:

- To impart different concepts in the field of Highway Engineering.
- To acquire design principles of Highway Geometrics and Pavements
- To learn various highway construction and maintenance procedures

Course Outcomes:
Upon the successful completion of this course, the students will be able to:

- Plan highway network for a given area.
- Determine Highway alignment and design highway geometrics
- Design Intersections and prepare traffic management plans
- Judge suitability of pavement materials and design flexible and rigid pavements
- Construct and maintain highways

SYLLABUS:

UNIT I
**Highway Planning and Alignment:** Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II **Highway Geometric Design:** Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III **Traffic Engineering:** Basic Parameters of Traffic-Volume, Speed and Density-Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road
Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method – IRC Method.


UNIT – V, Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors


Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements

TEXT BOOKS:


REFERENCES:

   2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi
7. Highway Engineering, Srinivasa Kumar R, Universities Press, Hyderabad
List of Experiments
1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and/or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli’s equation.
7. Impact of jet on vanes
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

List of Equipment:
1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli’s theorem setup.
8. Impact of jets.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.
List of Experiments

2. Theodolite Survey: Finding the distance between two inaccessible points.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station: Traversing
10. Total Station: Contouring
11. Total Station: Determination of Remote height.
12. Total Station: distance between two inaccessible points.

Note: Any 10 field work assignments must be completed.
Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:
Production and Cost Analysis:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III:
Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.
UNIT – IV:
Types of Business Organization and Business Cycles:

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

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**Course Outcome:**

*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.*

*One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.*

*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.*

**TEXT BOOKS**


**References:**

2. V. Maheswari: Managerial Economics, Sultan Chand.2014
COURSE STRUCTURE AND SYLLABUS

For

COMPUTER SCIENCE AND ENGINEERING

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
### I Year - I Semester

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<td>MC</td>
<td>Professional Ethics &amp; Human Values</td>
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### III Year - II Semester

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<td>Data Warehousing and Mining</td>
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<td>Design and Analysis of Algorithms</td>
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<td>i. Artificial Intelligence</td>
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<td>ii. Internet of Things</td>
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<td>iii Cyber Security</td>
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<td>iv.Digital Signal Processing</td>
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<td>v.Embedded Systems</td>
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<td>vi. Robotics</td>
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<td>Network Programming Lab</td>
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### IV Year - I Semester

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<td>Managerial Economics and Financial Analysis</td>
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<td>ii. Information Retrieval Systems</td>
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<td>iii. Mobile Computing</td>
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<td>i. Cloud Computing</td>
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<td>ii. Software Project Management</td>
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<td>iii. Scripting Languages</td>
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<td>Software Architecture &amp; Design Patterns Lab</td>
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### IV Year - II Semester

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<td>i. Concurrent and Parallel Programming</td>
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<td></td>
<td>ii. Artificial Neural Networks</td>
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<td>iii. Operations Research</td>
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Total Course Credits = \( 48 + 44 + 42 + 46 = 180 \)
SYLLABUS

I Year - I Semester

ENGLISH - I

4 0 0 3

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.
SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

**Assessment Procedure: Theory**

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters, and reports—are to be tested along with appropriate language and expressions.
4. Examinations:
   - Mid exam + II mid exam (15% for descriptive tests + 10% for online tests) = 25%
   - (80% for the best of two and 20% for the other)
   - Assignments = 5%
   - End semester exams = 70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

**DETAILED TEXTBOOK:**

**ENGLISH FOR ENGINEERS AND TECHNOLOGISTS**, Published by Orient Blackswan Pvt Ltd

**NON-DETAILED TEXTBOOK:**

**PANORAMA: A COURSE ON READING**, Published by Oxford University Press India

The course content along with the study material is divided into six units.

**UNIT I:**

1. ‘Human Resources’ from English for Engineers and Technologists.

**OBJECTIVE:**

To develop human resources to serve the society in different ways.
OUTCOME:
The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 2:

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

OBJECTIVE:
To highlight road safety measures whatever be the mode of transport.

OUTCOME:
The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama: A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 3:

1. 'Evaluating Technology' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the advantages and disadvantages of technology.

OUTCOME:
The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama: A Course on Reading'
OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 4:
1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

OBJECTIVE:
To bring into focus different sources of energy as alternatives to the depleting sources.

OUTCOME:
The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the fact that animals must be preserved because animal life is precious.

OUTCOME:
The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills
UNIT 6:

1. 'Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

OUTCOME:
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:
1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.

MODEL QUESTION PAPER FOR THEORY

PART- I
Six short answer questions on 6 unit themes
One question on eliciting student's response to any of the themes

PART-II
Each question should be from one unit and the last question can be a combination of two or more units.
Each question should have 3 sub questions: A,B & C
A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:
1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, $sin ax$, $cos ax$, polynomials in $x$, $e^{ax} V(x)$, $xV(x)$- Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT III: 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 (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:
Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).

UNIT V: First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.
UNIT VI: Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$. Classification of second order partial differential equations.

Text Books:

Reference Books:
3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
I Year - I Semester

MATHEMATICS-II (Mathematical Methods)
(Common to ALL branches of First Year B.Tech.)

Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

UNIT IV: Fourier Series:
Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet’s conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V: Applications of PDE:
Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.
UNIT VI: Fourier Transforms:

Text Books:

Reference Books:
1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
OBJECTIVES: Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

UNIT-I
INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II
DIFFRACTION: Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III
POLARIZATION: Types of Polarization – Methods of production - Nicol Prism - Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).


UNIT-IV
ELECTROMAGNETIC FIELDS: Scalar and Vector Fields – Electric Potential-Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V
UNIT-VI


SEMICONDUCTOR PHYSICS: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein’s equation – Hall effect in semiconductors

Outcome: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

Text Books:

Reference Books:
I Year - I Semester

COMPUTER PROGRAMMING

Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Introduction to C Programming - Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT-III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

UNIT-IV
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:
Arrays & Strings
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions
UNIT-VI:
Pointers, Structures, Files

Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, ReemaThareja, OXFORD.
Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

UNIT I Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

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

UNIT IV Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications

Reference Books:

3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
PREScribed LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks Practice work.

UNIT 2:

1. Responding to Requests and asking for Directions Practice work.

UNIT 3:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

UNIT 4:

1. Letters and Sounds Practice work.

UNIT 5:

1. The Sounds of English Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation
   Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
<td></td>
<td></td>
<td>Grammar</td>
<td>Vocabular y &amp; expressions</td>
<td></td>
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- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
I Year - I Semester

APPLIED/ENGINEERING PHYSICS LAB

(Any 10 of the following listed experiments)

Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a/technical/mini-project/ experimental report with scientific temper.
OBJECTIVES:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

- Acquire knowledge about the basic concept of writing a program.

- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

- Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

**Exercise – 7** Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

**Exercise – 8** Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

**Exercises - 9** Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

**Exercise - 10** Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

**Exercise – 11** Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs

**Exercise – 12** Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare

**Exercise -13** Files
a) Write a C programming code to open a file and to print it contents on screen.
b) Write a C program to copy files

**Exercise - 14** Files Continued
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.
Exercise - 15
a) System Assembling, Disassembling and identification of Parts / Peripherals. b) Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

Exercise - 16

a) MS-Office / Open Office
   ii) Spread Sheet - organize data, usage of formula, graphs, charts.
   iii) Powerpoint - features of power point, guidelines for preparing an effective presentation.

b) Network Configuration & Software Installation-Configuring TCP/IP, Proxy, and firewall settings. Installing application software, system software & tools.

OUTCOMES:

• Apply and practice logical ability to solve the problems.

• Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

• Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs

• Understand and apply the in-built functions and customized functions for solving the problems.

• Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

• Document and present the algorithms, flowcharts and programs in form of user-manuals

• Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.
Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.
**SPEAKING SKILLS:**

**Objectives:**

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

**READING SKILLS:**

**Objectives:**

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

**WRITING SKILLS:**

**Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

**Methodology:**

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports— are to be tested along with appropriate language and expressions.
4. Examinations:

   I mid exam + II mid exam (15% for descriptive tests +10% for online tests)= 25%
   (80% for the best of two and 20% for the other)
   Assignments= 5%
   End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cengage learning

The course content along with the study material is divided into six units.

UNIT 1:

1. 'The Greatest Resource- Education' from English Encounters

OBJECTIVE:

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.
OUTCOME:
The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

OUTCOME:
Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:

1. 'A Dilemma' from English Encounters

OBJECTIVE: The lesson centres on the pros and cons of the development of science and technology.

OUTCOME: The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

OUTCOME:
The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

OBJECTIVE:
The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

OUTCOME: The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.
OBJECTIVE:
The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

OUTCOME:
The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.

OBJECTIVE:
The lesson highlights insightful commentary on cultural traditions.

OUTCOME:
The theme projects society’s need to re-examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

OBJECTIVE:
The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

UNIT 5:
1. 'The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:
The essay presents several health disorders that spring out due to environmental changes.

OUTCOME:
The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. 'Prafulla Chandra Ray' from The Great Indian Scientists.
OBJECTIVE:
The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:
Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:
1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:
The lesson supports the developments of technology for the betterment of human life.

OUTCOME:
Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:
The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.
MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

UNIT II: Eigen values - Eigen vectors and Quadratic forms:

UNIT III: Multiple integrals:

UNIT IV: Special functions:
UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.
Applications: Work done, Force.

Text Books:


Reference Books:

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

UNIT I: HIGH POLYMERS AND PLASTICS

UNIT II: FUEL TECHNOLOGY
Explosives:- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.
UNIT III: ELECTROCHEMICAL CELLS AND CORROSION
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion:- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

UNIT V: SOLID STATE CHEMISTRY

UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES
Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

Non-conventional energy sources:
(i) Hydropower include setup a hydropower plant (schematic diagram)
(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
(v) Biomass and biofuels

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

Standard Books:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

Reference Books:
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
OBJECTIVES:

- This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose Programming language for solving a problem.

UNIT-I: Introduction to C++

UNIT-II: Classes and Objects &Constructors and Destructor
Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destorctors, Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor- Application with Constructor- Constructor with Arguments (parameterized Constructor- Destructors- Anonymous Objects.

UNIT-III: Operator Overloading and Type Conversion & Inheritance
The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance,

UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions
Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.
UNIT-V: Generic Programming with Templates & Exception Handling

UNIT-VI: Overview of Standard Template Library

OUTCOMES:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language. Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference

Text Books:
2. The Complete Reference C++, Herbert Schildt, TMH.

Reference Books:
2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learning.
Course Learning Objectives:
The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
Syllabus:


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.


The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.
Text Books:
1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

Reference:
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.


Friction: Introduction, limiting friction and impending motion, coulomb’s laws of dry friction, coefficient of friction, cone of friction

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.


UNIT – III
Objectives: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.
UNIT – V
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion. Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI
Objectives: The students are to be exposed to concepts of work, energy and particle motion

Text Books :


References:

I Year - II Semester

APPLIED / ENGINEERING CHEMISTRY LABORATORY (Common to all branches)

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na₂CO₃ solution.

3. Determination of alkalinity of a sample containing Na₂CO₃ and NaOH.

4. Determination of KMnO₄ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K₂Cr₂O₇ solution.

6. Determination of Copper using standard K₂Cr₂O₇ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books
OBJECTIVES:
To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
1. Debating
   Practice work

UNIT 2:
1. Group Discussions
   Practice work

UNIT 3:
1. Presentation Skills
   Practice work

UNIT 4:
1. Interview Skills
   Practice work

UNIT 5:
1. Email,
2. Curriculum Vitae
   Practice work
UNIT 6:

1. Idiomatic Expressions
2. Common Errors in English
   Practice work

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVE

• To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.

• To introduce object oriented concepts in C++ and Java.

Programmig:

Exercise – 1 (Basics)
Write a Simple Program on printing “Hello World” and “Hello Name” where name is the input from the user
a) Convert any two programs that are written in C into C++
b) Write a description of using g++ (150 Words)

Exercise – 2 (Expressions Control Flow)
a) Write a Program that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.

b) Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks “What distance will you travel?” On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

Exercise – 3 (Variables, Scope, Allocation)
a) Write a program to implement call by value and call by reference using reference variable.

b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory Allocation)

c) Write a program to illustrate Storage classes

d) Write a program to illustrate Enumerations
Exercises –4 (Functions)
Write a program illustrating Inline Functions
   a) Write a program illustrate function overloading. Write 2 overloading functions for power.
   b) Write a program illustrate the use of default arguments for simple interest function.

Exercise -5 (Functions –Exercise  Continued)
a) Write a program to illustrate function overloading. Write 2 overloading functions for adding
two numbers
b) Write a program illustrate function template for power of a number.

c) Write a program to illustrate function template for swapping of two numbers.

Exercise -6 (Classes Objects)
Create a Distance class with:
   • feet and inches as data members
   • member function to input distance
   • member function to output distance
   • member function to add two distance objects

   a). Write a main function to create objects of DISTANCE class. Input two distances and output
the sum.
   b) Write a C++ Program to illustrate the use of Constructors and Destructors (use the
above program.)
   c) Write a program for illustrating function overloading in adding the distance between objects
(use the above problem)
   d) Write a C++ program demonstrating a BankAccount with necessary methods and variables

Exercise – 7 (Access)
Write a program for illustrating Access Specifiers public, private, protected
   a) Write a program implementing Friend Function
   b) Write a program to illustrate this pointer
   c) Write a Program to illustrate pointer to a class
   d) 

Exercise -8 (Operator Overloading)
a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non
   Member Function.
   i. Unary operator as member function
   ii. Binary operator as nonmember function
b). Write a C++ program to implement the overloading assignment = operator

c). Write a case study on Overloading Operators and Overloading Functions (150 Words)

**Exercise -9** (Inheritance)
a) Write C++ Programs and incorporating various forms of Inheritance
   i) Single Inheritance
   ii) Hierarchical Inheritance
   iii) Multiple Inheritances
   iv) Multi-level inheritance
   v) Hybrid inheritance
b) Write a program to show Virtual Base Class

c) Write a case study on using virtual classes (150 Words)

**Exercise-10** (Inheritance –Continued)
a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance
b) Write a Program to show how constructors are invoked in derived class

**Exercise -11** (Polymorphism)
a) Write a program to illustrate runtime polymorphism
b) Write a program to illustrate this pointer
c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.
d) Write a case study on virtual functions (150 Words)

**Exercise -12**(Templates)
a) Write a C++ Program to illustrate template class
b) Write a Program to illustrate class templates with multiple parameters
c) Write a Program to illustrate member function templates

**Exercise -13** (Exception Handling)
a) Write a Program for Exception Handling Divide by zero
b) Write a Program to rethrow an Exception

**Exercise -14** (STL)
a) Write a Program to implement List and List Operations
b) Write a Program to implement Vector and Vector Operations

**Exercise -15** (STLContinued)
a) Write a Program to implement Deque and Deque Operations
b) Write a Program to implement Map and Map Operations
OUTCOMES:

- Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.

- Apply an object-oriented approach to developing applications of varying complexities.
OBJECTIVE:
After taking the course, students will be able to
- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

UNIT-I:
Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT-II:
R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT-III:

UNIT-IV:
Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

UNIT-V:
Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.
UNIT-VI:
Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

OUTCOMES:
At the end of this course, students will be able to:
• List motivation for learning a programming language
• Access online resources for R and import new function packages into the R workspace
• Import, review, manipulate and summarize data-sets in R
• Explore data-sets to create testable hypotheses and identify appropriate statistical tests
• Perform appropriate statistical tests using R Create and edit visualizations with

TEXT BOOKS:
1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson

REFERENCE BOOKS:
1) R Cookbook, PaulTeetor, Oreilly.
2) R in Action,Rob Kabacoff, Manning
OBJECTIVES:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

UNIT -I:

UNIT -II:

UNIT -III:

UNIT -IV:
UNIT -V:
**Recurrence Relations:** Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT -VI:
**Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler’s Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

OUTCOMES:
- Student will be able to demonstrate skills in solving mathematical problems
- Student will be able to comprehend mathematical principles and logic
- Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
- Student will be able to communicate effectively mathematical ideas/results verbally or in writing

TEXT BOOKS:

REFERENCE BOOKS:
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
OBJECTIVE:
- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

UNIT- I: Digital Systems and Binary Numbers
Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction

UNIT -II: Concept of Boolean algebra
Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

UNIT- III: Gate level Minimization

UNIT- IV: Combinational Logic
Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

UNIT- V: Synchronous Sequential Logic
Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked Sequential Circuits, Mealy and Moore Models of Finite State Machines

UNIT -VI: Registers and Counters
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter
OUTCOMES:
A student who successfully fulfills the course requirements will have demonstrated:

- An ability to define different number systems, binary addition and subtraction, 2’s complement representation and operations with this representation.
- An ability to understand the different switching algebra theorems and apply them for logic functions.
- An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.

TEXT BOOKS:
1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCE BOOKS:
1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.
OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

UNIT – I:
Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:
Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:
Data Structures Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – IV:
Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions
UNIT – VI:
**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

**Testing:** Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

**OUTCOMES:**
- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software

**TEXT BOOKS**
2. Learning Python, Mark Lutz, Orielly

**Reference Books:**
1. Think Python, Allen Downey, Green Tea Press
3. Introduction to Python, Kenneth A. Lambert, Cengage
OBJECTIVES:
- To be familiar with basic techniques of object oriented principles and exception handling using C++
- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVL.Trees, and B Trees.

UNIT-I: ARRAYS
Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES
Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

UNIT-IV: TREES
Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into aThreaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.
UNIT-V: GRAPHS
The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal’s Algorithm, Prim’s Algorithm, Sollin’s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

UNIT-VI: SORTING
Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

OUTCOMES:
- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. 
- Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

TEXT BOOKS:

REFERENCE BOOKS:
1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
OBJECTIVES:
- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

UNIT-I:
**2D Primitives** Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT-II:
**3D Concepts** Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

UNIT-III:
**Graphics Programming** Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

UNIT- IV:
**Rendering** Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

UNIT- V:
**Fractals** Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals
UNIT- VI:  
**Overview of Ray Tracing** Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

**OUTCOMES:**

- Know and be able to describe the general software architecture of programs that use 3D computer graphics.
- Know and be able to discuss hardware system architecture for computer graphics. This includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.
- Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

**TEXT BOOKS:**


**REFERENCE BOOKS:**

DATASTRUCTURES THROUGH C++ LAB

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

List of Experiments:

1. Implementation of Singly linked list.
2. Implementation of Doubly linked list.
4. Implementation of Circular Queue
5. Implementation of Binary Search trees.
8. Implementation of Breadth First Search Techniques.
10. Implementation of Prim’s Algorithm.
11. Implementation of Dijkstra’s Algorithm.
12. Implementation of Kruskal’s Algorithm
13. Implementation of MergeSort
14. Implementation of Quick Sort
15. Implementation of Data Searching using divide and conquer technique

OUTCOMES:

At the end of this lab session, the student will
- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem

Have practical knowledge on the application of data structures
Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
c) Write a program using a for loop that loops over a sequence. What is sequence ?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.
   Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

   1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

  Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

  If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write function to compute gcd, lcm of two numbers. Each function shouldn’t exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages requests, flask and explore them. using (pip)
b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page
Exercise - 13 OOP

a) Class variables and instance variable and illustration of the self variable
   i) Robot
   ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle

![Figure 1](image1.png)  ![Figure 2](image2.png)

Exercise - 15 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers
b) Write a test-case to check the function reverse_string which returns the reversed string

Exercise - 16 - Advanced

a) Build any one classical data structure.
b) Write a program to solve knapsack problem.
OBJECTIVES

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

UNIT-I:

UNIT-II:

UNIT – III:
User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT – IV:
UNIT – V:
**Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

**Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

UNIT – VI

**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

**Software Reuse:** what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

OUTCOMES
- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:

- Understanding the OOP’s concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development.

UNIT-I:
Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II:
Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III:
Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V:
Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.
UNIT-VI:

OUTCOMES:
- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

TEXT BOOKS:
1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.

REFERENCE BOOKS:
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.
OBJECTIVES:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
- Demonstrate an understanding of external memory and external search and sorting algorithms.
- Demonstrate an understanding of simple Entity-Relationship models for databases.

UNIT-I: SORTING

UNIT-II: HASHING
Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing,

UNIT-III: PRIORITY QUEUES (HEAPS)

UNIT-IV: EFFICIENT BINARY SEARCH TREES

UNIT-V: MULTIWAY SEARCH TREES
M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.
UNIT-VI: DIGITAL SEARCH STRUCTURES
Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length- Height of a Trie- Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labeled Edges- Space Required by a Compressed Tries, Tries and Internet Packet Forwarding ,- IP Routing- 1-Bit Tries- Fixed-Stride Tries-Variable-Stride Tries.

OUTCOMES:

• Be able to understand and apply amortised analysis on data structures, including binary search trees, mergable heaps, and disjoint sets.
• Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform.
• Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching, game-theory

TEXT BOOKS:
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press

REFERENCE BOOKS:
1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
OBJECTIVES:

- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- In addition to this the memory management system of computer.

UNIT -I:

UNIT -II:
Machine Instruction and Programs:
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:
Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -IV:

UNIT -V:
The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING
Secondary Storage: Magnetic Hard Disks, Optical Disks,
UNIT -VI:

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control,

**Micro programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

OUTCOMES:

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- Students can calculate the effective address of an operand by addressing modes
- They can understand how computer stores positive and negative numbers.
- Understanding of how a computer performs arithmetic operation of positive and negative numbers.

TEXT BOOKS:


REFERENCE BOOKS:

OBJECTIVE:
- Introduce the student to the concepts of Theory of computation in computer science
- The students should acquire insights into the relationship among formal languages, formal Grammars and automat.

UNIT – I: Finite Automata

UNIT – II: Regular Expressions

UNIT – III: Context Free Grammars

UNIT – IV: Pushdown Automata

UNIT – V: Turning Machine
UNIT – VI: Computability
Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post’s Correspondence Problem, Modified Post’s Correspondence Problem, Classes of P and NP, NP-Hard and NP-Complete Problems.

OUTCOMES:
- Classify machines by their power to recognize languages,
- Employ finite state machines to solve problems in computing,
- Explain deterministic and non-deterministic machines,
- Comprehend the hierarchy of problems arising in the computer science

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:
- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

UNIT- I:
Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive decent bottom-up parsing

UNIT- II:
Data, data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, assignment statements, mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT- III:
Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

UNIT- IV:
Object-orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT -V:
Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML,
UNIT -VI:

Logic programming languages: Introduction to logic and logic programming, –
Programming with Prolog, multi - paradigm languages

OUTCOMES:

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs
- Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

TEXT BOOKS:


REFERENCE BOOKS:

OBJECTIVES:

- To understand heap and various tree structures like AVL, Red-black, B and Segment trees
- To understand the problems such as line segment intersection, convex shell and Voronoi diagram

Programming:

1. To perform various operations i.e., insertions and deletions on AVL trees.
2. To implement operations on binary heap.
   
   - i) Vertex insertion
   - ii) Vertex deletion
   - iii) Finding vertex
   - iv) Edge addition and deletion
3. To implement Prim’s algorithm to generate a min-cost spanning tree.
4. To implement Kruskal’s algorithm to generate a min-cost spanning tree.
5. To implement Dijkstra’s algorithm to find shortest path in the graph.
6. To implementation of Static Hashing (Use Linear probing for collision resolution)
7. To implement of Huffmann coding.
8. To implement of B-tree.

OUTCOMES:

- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram
Exercise - 1  (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax^2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on `public static void main(250 words)`

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements using bubble sort

(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.

(d) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a). Write a JAVA program to implement Single Inheritance

b). Write a JAVA program to implement multi level Inheritance

c). Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

a). Write a JAVA program give example for “super” keyword.

b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
**Exercise - 7 (Exception)**
a). Write a JAVA program that describes exception handling mechanism

   b). Write a JAVA program Illustrating Multiple catch clauses

**Exercise – 8 (Runtime Polymorphism)**
a). Write a JAVA program that implements Runtime polymorphism

   b). Write a Case study on run time polymorphism, inheritance that implements in above problem

**Exercise – 9 (User defined Exception)**
   a). Write a JAVA program for creation of Illustrating throw

   b). Write a JAVA program for creation of Illustrating finally

   c). Write a JAVA program for creation of Java Built-in Exceptions

   d). Write a JAVA program for creation of User Defined Exception

**Exercise – 10 (Threads)**
a). Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third display “Welcome” every 3 seconds. (Repeat the same by implementing Runnable)

   b). Write a program illustrating `isAlive` and `join`

   c). Write a Program illustrating Daemon Threads.

**Exercise - 11 (Threads continuity)**
a). Write a JAVA program Producer Consumer Problem

   b). Write a case study on thread Synchronization after solving the above producer consumer problem

**Exercise – 12 (Packages)**
a). Write a JAVA program illustrate class path

   b). Write a case study on including in class path in your os environment of your package.

   c). Write a JAVA program that import and use the defined your package in the previous Problem

**Exercise - 13 (Applet)**
a). Write a JAVA program to paint like paint brush in applet.

   b) Write a JAVA program to display analog clock using Applet.

   c). Write a JAVA program to create different shapes and fill colors using Applet.

**Exercise - 14 (Event Handling)**
a). Write a JAVA program that display the x and y position of the cursor movement using
b). Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)
a). Write a JAVA program to build a Calculator in Swings
b). Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)
a). Write a JAVA program that to create a single ball bouncing inside a JPanel.
b). Write a JAVA program JTree as displaying a real tree upside down
OBJECTIVES:
• Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

UNIT – I
Lexical Analysis:-: The role of lexical analysis buffing, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II
Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down passing bottom up parsing Introduction to Lr Parser.

UNIT –III

UNIT – IV
Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching?

UNIT – V
Runtime Environments, Stack allocation of space, access to Non Local date on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

UNIT –VI
Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Date flow Analysis.
OUTCOMES:

- Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.
- Parser and its types i.e. Top-down and Bottom-up parsers.
- Construction of LL, SLR, CLR and LALR parse table.
- Syntax directed translation, synthesized and inherited attributes.
- Techniques for code optimization.

TEXT BOOKS:


2. Compiler Design K. Muneeswaran, OXFORD


REFERENCE BOOKS:

1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE

2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER
OBJECTIVES:

• Written technical communication and effective use of concepts and terminology.
• Facility with UNIX command syntax and semantics.
• Ability to read and understand specifications, scripts and programs.
• Individual capability in problem solving using the tools presented within the class.
  Students will demonstrate a mastery of the course materials and concepts within in class discussions.

UNIT-I
Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

UNIT-III

UNIT-IV
Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

UNIT-VI
OUTCOMES:
• Documentation will demonstrate good organization and readability.
• File processing projects will require data organization, problem solving and research.
• Scripts and programs will demonstrate simple effective user interfaces.
• Scripts and programs will demonstrate effective use of structured programming.
• Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
• Testing will demonstrate both black and glass box testing strategies.
• Project work will involve group participation.

TEXT BOOKS:
1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:
1. Unix and shell programming by B.M. Harwani, OXFORD university press.
OBJECTIVE:
- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language

UNIT-I:

UNIT-II:
Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

UNIT-III:

UNIT-IV:

UNIT-V:
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-VI:
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.
Case Study: The Unified Library application.

OUTCOME:
- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain
TEXT BOOKS:
1. “Object-Oriented Analysis And Design with Applications”, Grady BOOCHE, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.

REFERENCE BOOKS:
1. “Object-oriented analysis and design using UML”, Mahesh P. Matha, PHI
2. “Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
OBJECTIVES

- To learn the principles of systematically designing and using large scale Database Management Systems for various applications.


UNIT-II:

UNIT-III:
Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV:
Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).
UNIT-V:
Transaction Management and Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point.


UNIT-VI:
Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

OUTCOMES
• Describe a relational database and object-oriented database.
• Create, maintain and manipulate a relational database using SQL
• Describe ER model and normalization for database design.
• Examine issues in data storage and query processing and can formulate appropriate solutions.
• Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
• Design and build database system for a given real world problem

TEXT BOOKS:
1. Introduction to Database Systems, CJ Date, Pearson

REFERENCES BOOKS:
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
OBJECTIVES:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I
Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II:

UNIT-III:
Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation
Virtual Memory Management:
Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:
Concurrency: ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples
Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock
UNIT-V:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
File System implementation- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI:
Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.


OUTCOMES:
- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

TEXT BOOK:

REFERENCES:
OBJECTIVES:
- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

Week 1:
Familiarization with Rational Rose or Umbrello

For each case study:

Week 2, 3 & 4:
For each case study:
- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:
- For each case study:
  - a) Develop Use case diagrams
  - b) Develop elaborate Use case descriptions & scenarios
  - c) Develop prototypes (without functionality)
  - d) Develop system sequence diagrams

Week 7, 8, 9 & 10:
For each case study:
- a) Develop high-level sequence diagrams for each use case
- b) Identify MVC classes / objects for each use case
- c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- e) Develop three-layer package diagrams for each case study

Week 11 & 12:
- For each case study:
  - a) Develop Use case Packages
  - b) Develop component diagrams
  - c) Identify relationships between use cases and represent them
  - d) Refine domain class model by showing all the associations among classes

Week 13 onwards:
- For each case study:
• a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

**OUTCOMES:**
• Understand the Case studies and design the Model.
• Understand how design patterns solve design problems.
• Develop design solutions using creational patterns.

Construct design solutions by using structural and behavioral patterns
OBJECTIVES:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with the Linux environment.
- To learn the fundamentals of shell scripting/programming.
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem.

OPERATING SYSTEMS

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls
3. Simulate the following
   a) Multiprogramming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention.
6. Simulate the following page replacement algorithms.
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies
   a) Sequenced b) Indexed c) Linked

LINUX PROGRAMMING

1. a) Study of Unix/Linux general purpose utility command list
   man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history,
   chmod, chown, finger, pwd, cal, logout, shutdown.
   b) Study of vi editor.
   c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
   d) Study of Unix/Linux file system (tree structure).
   e) Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls
3. Write a C program to emulate the UNIX ls –l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.
   Ex: - ls –l | sort
5. Write a C program that illustrates two processes communicating using shared memory
6. Write a C program to simulate producer and consumer problem using semaphores
7. Write C program to create a thread using pthreads library and let it run its function.
8. Write a C program to illustrate concurrent execution of threads using pthreads library.

OUTCOMES:
- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Students will be able to use Linux environment efficiently
- Solve problems using bash for shell scripting
- Will be able to implement algorithms to solve data mining problems using weka tool
OBJECTIVES:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

List of Experiments:

SQL
1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
4. Queries using Group By, Order By, and Having Clauses
5. Queries on Controlling Data: Commit, Rollback, and Save point
6. Queries to Build Report in SQL *PLUS
7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
8. Queries on Joins and Correlated Sub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL
10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of
Assignment Operation


12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types


15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18

16. Demonstration of database connectivity

OUTCOMES:
- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

Note: The creation of sample database for the purpose of the experiments is expected to be predecided by the instructor.

Text Books/Suggested Reading:
1. Oracle: The Complete Reference by Oracle Press
PROFESSIONAL ETHICS AND HUMAN VALUES

Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:

UNIT II: Principles for Harmony:

UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:
UNIT V: Engineers’ Duties and Rights:

UNIT VI: Global Issues:

- Related Cases Shall be dealt wherever necessary.

Outcome:
*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

UNIT – I:

UNIT – II:
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III:

UNIT – IV:

UNIT – V:
UNIT – VI:
Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

OUTCOMES:
• Understand OSI and TCP/IP models
• Analyze MAC layer protocols and LAN technologies
• Design applications using internet protocols
• Understand routing and congestion control algorithms
• Understand how internet works

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:
- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT –I:  

UNIT –II:  
**Data Pre-processing:** Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III:  
**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV:  
**Classification: Alternative Techniques,** Bayes’ Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V  
**Association Analysis:** Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. *(Tan & Vipin)*

UNIT –VI  
OUTCOMES:
- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
OBJECTIVES:
Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:

UNIT-V:
Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

UNIT-VI:
Branch and Bound: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

OUTCOMES:
Students who complete the course will have demonstrated the ability to do the following:
• Argue the correctness of algorithms using inductive proofs and invariants.
• Analyze worst-case running times of algorithms using asymptotic analysis.
• Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
• Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
• Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

TEXT BOOKS:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2. Introduction to Algorithms Thomas H. Cormen, PHI Learning

REFERENCE BOOKS

1. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
OBJECTIVE:
  Fundamentals for various testing methodologies.
  
  - Describe the principles and procedures for designing test cases.
  - Provide supports to debugging methods.
  - Acts as the reference for software testing techniques and strategies.

UNIT-I:
Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

UNIT-II:

UNIT-III:

UNIT-IV:
Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT – V:
**Graph Matrices and Application:** Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

**UNIT -VI:**

**Software Testing Tools:** Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

**OUTCOME:**
- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

**TEXT BOOKS:**
2. Software Testing- Yogesh Singh, Camebridge

**REFERENCE BOOKS:**
1. The Craft of software testing - Brian Marick, Pearson Education.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge UnivPRESS.
OBJECTIVES:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

UNIT-I:
Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:
Problem solving: state-space search and control strategies :Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:
Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:
Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:
Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools
UNIT-VI:
Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory
Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

OUTCOMES:
- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

TEXT BOOKS:
1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERENCE BOOKS:
1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
INTERNET OF THINGS
(Open Elective)

OBJECTIVES:

• Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
• Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
• Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
• Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

UNIT - I:
The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

UNIT – II:
Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT – III:

UNIT– IV:

UNIT– V:
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in
the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT – VI


OUTCOMES:
- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

TEXTBOOKS:
- Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education

REFERENCE BOOKS:
1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister, Oreilly
CYBER SECURITY
(Open Elective)

OBJECTIVES:

• The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
• Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

UNIT- I: Introduction to Cybercrime:

UNIT -II: Cyber offenses:

UNIT -III: Cybercrime Mobile and Wireless Devices:

UNIT -IV: Tools and Methods Used in Cybercrime:
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft:Introduction, Phishing, Identity Theft (IDTheft)

UNIT -V: Cybercrimes and Cyber security:
UNIT -VI: Understanding Computer Forensics:

OUTCOMES:
- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

TEXT BOOKS:

REFERENCES:
1. Information Security, Mark Rhodes, Ousley, MGH.
DIGITAL SIGNAL PROCESSING
(Open Elective)

OBJECTIVES:
- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

UNIT -I
Discrete Fourier Transform
DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

UNIT -II
Infinite Impulse Response Digital Filters

UNIT- III
Finite Impulse Response Digital Filters

UNIT -IV
Finite Word Length Effects
Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error –

UNIT -V
Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

UNIT -VI
Multirate Signal Processing
Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.
OUTCOMES:

• an ability to apply knowledge of Mathematics, science, and engineering
• an ability to design and conduct experiments and interpret data
• an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
• an ability to function as part of a multi-disciplinary team

TEXT BOOKS:


REFERENCE BOOKS:

OBJECTIVES:
- Technology capabilities and limitations of the hardware, software components
- Methods to evaluate design tradeoffs between different technology choices.
- Design Methodologies

UNIT-I:
Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT-II:
8—bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT-III:
RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-IV:
Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher’s problem.

UNIT-V:
The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-VI:
OUTCOMES:

Understand the basics of an embedded system
- Program an embedded system
- Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems
- Explain the general structure of a real-time system
- Define the unique design problems and challenges of real-time systems

TEXT BOOK:

REFERENCE BOOKS:
1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
OBJECTIVES:

- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

UNIT-I: Introduction
Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

UNIT-II: Orientations and frames, Mappings

UNIT-III: Robot Drives and Power Transmission Systems
Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

UNIT-IV: Manipulators
Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT-V: Robot End Effectors
UNIT -VI:  
Path planning & Programming  
Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

OUTCOMES:  
- The Student must be able to design automatic manufacturing cells with robotic control using  
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

TEXT BOOKS:  

REFERENCE BOOKS:  
OBJECTIVES:

- To write, execute and debug C programs which use Socket API.
- To understand the use of client/server architecture in application development.
- To understand how to use TCP and UDP based sockets and their differences.
- To get acquainted with UNIX system internals like Socket files, IPC structures.
- To Design reliable servers using both TCP and UDP sockets.

Prerequisites:

Knowledge of C Programming, Basic commands of UNIX.

List of Programs

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whois etc. Usage of elementary socket system calls (socket(), bind(), listen(), accept(), connect(), send(), recv(), sendto(), recvfrom()).

2. Implementation of Connection oriented concurrent service (TCP).

3. Implementation of Connectionless Iterative time service (UDP).

4. Implementation of Select system call.

5. Implementation of getssockopt(), setsockopt() system calls.

6. Implementation of getpeername() system call.

7. Implementation of remote command execution using socket system calls.

8. Implementation of Distance Vector Routing Algorithm.

9. Implementation of SMTP.
10. Implementation of FTP.

11. Implementation of HTTP.


Note: Implement programs 2 to 7 in C and 8 to 12 in JAVA.

OUTCOMES:
- Understand and explain the basic concepts of Grid Computing;
- Explain the advantages of using Grid Computing within a given environment;
- Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.
- Discuss some of the enabling technologies e.g. high-speed links and storage area networks.
- Build computer grids.

SUGGESTED READING:
OBJECTIVES:
- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with C language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications

1 Write programs in ‘C’ Language to demonstrate the working of the following constructs:
   i) do...while
   ii) while….do
   iii) if…else
   iv) switch
   v) for

2 “A program written in ‘C’ language for Matrix Multiplication fails” Introspect the causes for its failure and write down the possible reasons for its failure.

3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4 Write the test cases for any known application (e.g. Banking application)

5 Create a test plan document for any application (e.g. Library Management System)

6 Study of Win Runner Testing Tool and its implementation
   b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.
   c) How to record a test script and explains the basics of Test Script Language (TSL).
   d) How to synchronize a test when the application responds slowly.
   e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.
   f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.
g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.

h) How to read and check text found in GUI objects and bitmaps.

i) How to create a batch test that automatically runs the tests.

j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

7 Apply Win Runner testing tool implementation in any real time applications.

OUTCOMES:
- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams

Define, formulate and analyze a problem
DATA WARE HOUSING AND DATA MINING LAB

OBJECTIVES:
- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

System/Software Requirements:
- Intel based desktop PC
- WEKA TOOL

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k-means.
OUTCOMES:

- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
Objectives:
*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

Unit I: Introduction to Intellectual Property Rights (IPR)

Unit II: Copyrights and Neighboring Rights

UNIT III: Patents

UNIT IV: Trademarks

UNIT V: Trade Secrets
UNIT VI: Cyber Law and Cyber Crime

- Relevant Cases Shall be dealt where ever necessary.

Outcome:
* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
* Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

References:

6. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
OBJECTIVES:
- In this course the following principles and practice of cryptography and network security are covered:
- Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
- Public-key cryptography (RSA, discrete logarithms),
- Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
- Email and web security, viruses, firewalls, digital right management, and other topics.

UNIT- I:
Basic Principles
Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography

UNIT- II:
Symmetric Encryption

UNIT- III:
Asymmetric Encryption
Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

UNIT- IV:
Data Integrity, Digital Signature Schemes & Key Management
Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT- V:
Network Security-I
Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

UNIT -VI:
Network Security-II
Security at the Network Layer: IPSec, System Security
OUTCOMES:

- To be familiar with information security awareness and a clear understanding of its importance.
- To master fundamentals of secret and public cryptography
- To master protocols for security services
- To be familiar with network security threats and countermeasures
- To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)

TEXT BOOKS:


REFERENCE BOOKS:

OBJECTIVES:
The course should enable the student:

- To understand interrelationships, principles and guidelines governing architecture and evolution over time.
- To understand various architectural styles of software systems.
- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

UNIT-I:
Envisioning Architecture


UNIT-II:
Analyzing Architectures
Architecture Evaluation, Architecture design decision making, ATAM, CBAM

Moving from One System to Many
Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT-III:
Patterns
Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creational Patterns
Abstract factory, Builder, Factory method, Prototype, Singleton

UNIT-IV:
Structural Patterns
Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V:
Behavioral Patterns
Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

**UNIT-VI:**

**Case Studies**


**A Case Study (Designing a Document Editor):** Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

**TEXT BOOKS:**


**REFERENCE BOOKS:**


2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001


5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006


OBJECTIVES:
- This course is designed to introduce students with no programming experience to the
  programming languages and techniques associated with the World Wide Web. The
  course will introduce web-based media-rich programming tools for creating interactive
  web pages.

UNIT-I: HTML, CSS
Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext
Links, Lists, Tables, Forms, HTML5

CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model,
Conflict Resolution

UNIT-II:
Java script
The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and
Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions,
Constructors, Pattern Matching using Regular Expressions
DHTML: Positioning Moving and Changing Elements

UNIT-III:
XML: Document type Definition, XML schemas, Document object model, XSLT,
DOM and SAX Approaches,

AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

UNIT-IV:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script.
Working with variables and constants: Using variables, Using constants, Data
types,Operators.
Controlling program flow: Conditional statements,Control
statements,Arrays,functions.Working with forms and Databases such as MySQL.

UNIT-V:
Introduction to PERL, Operators and if statements, Program design and control structures, Arrays,
Hashes and File handling, Regular expressions, Subroutines, Retrieving documents from the web with
Perl.

UNIT-VI:
Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes,
Iterators, Pattern Matching. Overview of Rails.
OUTCOMES:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages.
- Build web applications using PHP.
- Programming through PERL and Ruby
- Write simple client-side scripts using AJAX

TEXT BOOKS:

2. Web Technologies, Uttam K Roy, Oxford

REFERENCE BOOKS:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:
Production and Cost Analyses:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions- Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost – Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III:
Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

UNIT – IV:
Types of Business Organization and Business Cycles:
Unit – V:
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

UNIT – VI:
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Course Outcome:
*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

TEXT BOOKS

REFERENCES:
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
OBJECTIVES:
• Optimize business decisions and create competitive advantage with Big Data analytics
• Introducing Java concepts required for developing map reduce programs
• Derive business benefit from unstructured data
• Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
• To introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT-I
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and
Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of
Serialization

UNIT-II
Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) –
Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker,
TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode,
Fully Distributed mode), Configuring XML files.

UNIT-III
Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for
MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code,
Mapper code, Reducer code, RecordReader, Combiner, Partitioner

UNIT-IV
Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes:
Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and
GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a
RawComparator for speed, Custom comparators

UNIT-V
Pig: Hadoop Programming Made Easier
Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the
ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking
out the Pig Script Interfaces, Scripting with Pig Latin

UNIT-VI
Applying Structure to Hadoop Data with Hive:
Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive,
Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases
and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing
Data
OUTCOMES:

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

TEXT BOOKS:

3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne

SOFTWARE LINKS:

2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html
INFORMATION RETRIEVAL SYSTEMS
(Elective - 1)

OBJECTIVES

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

UNIT - I:

UNIT- II:
Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

UNIT -III:
Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT- IV:
New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

UNIT- V:
Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

UNIT- VI:
Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri
OUTCOMES

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understands the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.

TEXT BOOK:
2 Modern Information Retrieval by Yates Pearson Education.

REFERENCES:
2. Information retrieval Algorithms and Heuristics, 2ed, Springer
MOBILE COMPUTING
( Elective - 1)

OBJECTIVE:

• To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
• To understand the typical mobile networking infrastructure through a popular GSM protocol
• To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
• To understand the database issues in mobile environments & data delivery models.
• To understand the ad hoc networks and related concepts.
• To understand the platforms and protocols used in mobile environment.

UNIT- I
Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.
GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II
(Wireless) Medium Access Control (MAC) :Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III
Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

UNIT- V
UNIT- VI
Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.


OUTCOMES:
- Able to think and develop new mobile application.
- Able to take any new technical issue related to this new paradigm and come up with a solution(s).
- Able to develop new ad hoc network applications and/or algorithms/protocols.
- Able to understand & develop any existing or new protocol related to mobile environment

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:

- The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet concepts capabilities across the various cloud service models including IaaS, PaaS, SaaS, and developing cloud based software applications on top of cloud platforms.

UNIT -I: Systems modeling, Clustering and virtualization
Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT- II: Virtual Machines and Virtualization of Clusters and Data Centers
Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT- III: Cloud Platform Architecture

UNIT -IV: Cloud Programming and Software Environments

UNIT- V: Cloud Resource Management and Scheduling

UNIT- VI: Storage Systems
Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3)
OUTCOMES:

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer’s for actively initiating and installing cloud-based applications.
- Assessment of own organizations’ needs for capacity building and training in cloud computing-related IT areas

TEXT BOOKS:

REFERENCE BOOKS:
SOFTWARE PROJECT MANAGEMENT
(Elective - 2)

OBJECTIVES:
• To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
• To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
• To understand successful software projects that support organization’s strategic goals

UNIT -I: Introduction
Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals
Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

UNIT -II: Project Approach
Lifecycle models, Choosing Technology, Prototyping
Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

UNIT -III: Effort estimation & activity Planning
Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis

UNIT -IV: Risk Management
Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT -V: Project Monitoring & Control, Resource Allocation
Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

UNIT -VI: Software Quality
OUTCOMES:

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill

REFERENCE BOOKS:

1. Software Project Management, Joel Henry, Pearson Education.
OBJECTIVES:

- The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Bio-data.
- The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

UNIT - I
Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - II
Advanced perl Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT- III
PHP Basics PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT - IV
Advanced PHP Programming PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

UNIT -V
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT- VI
OUTCOMES:

- To master the theory behind scripting and its relationship to classic programming.
- To survey many of the modern and way cool language features that show up frequently in scripting languages.
- To gain some fluency programming in Ruby, JavaScript, Perl, Python, and related languages.
- To design and implement one's own scripting language.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz,SPD.
4. PHP 5.1, I.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
7. Perl by Example, E.Quigley, Pearson Education.
Software Architecture Lab

The course project is divided in 6 small components that will be performed during the different lab sessions; there are, in principle, 7 lab sessions. The project consists of the design and implementation of the software architecture of a Weather Mapping System (WMS). Implementation will take place both in Java and C++ (combination of both languages). Each lab assignment consists of a theoretical part and a practical part, which are defined in specific lab assignment statements that are posted at least one or two weeks before the session.

Report and demo (if applicable) for each assignment is due for the following session.

1. Tool Presentation

This session is an introductory session; there is no lab assignment for this session.

Introduction to working with an industrial strength software development environment, namely Rational Rose: how to write and maintain a UML specification; configuration management; architecture design; CORBA-IDL document generation; Java code generation from a UML model etc.

Presentation of the Project: Weather Mapping System.

2. Use Case View

Design of the Use Case View. Risk Analysis.

3: Logical View

Design of the Logical View of the Weather Mapping System (WMS).

4: Integrating Patterns in the Architecture

Integration of selected architectural and design patterns in the logical view obtained previously.

5: Implementation, Process, and Deployment Views

Design of the implementation, process, and deployment views for the Weather Mapping System.

6: Component and Interprocess Communication Design
Generation from the previous architecture design of CORBA Interfaces and Components Definitions.

7: Implementation of WMS

Implementation of the Weather Mapping System (Java & C++), with a particular emphasis on the Interprocess communication mechanism and the software components identified.

Lab Reports:

Lab reports should include:

- The answers to the questions included in the assignment statement. The answers should motivate briefly your design choices.
- The printout of the diagrams and related documents (e.g. class, use cases, operations descriptions etc.) produced using Rational Rose.

Reference: [http://www.ece.uvic.ca/~itraore/seng422-06/eng422-06.html](http://www.ece.uvic.ca/~itraore/seng422-06/eng422-06.html)

Design Patterns Lab

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<tr>
<th>S. No</th>
<th>Programs</th>
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<tbody>
<tr>
<td>1.</td>
<td>Use case Diagram for Librarian Scenario</td>
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<tr>
<td>2.</td>
<td>Using UML design Abstract factory design pattern</td>
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<tr>
<td>3.</td>
<td>Using UML design Adapter-class Design pattern</td>
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<tr>
<td>4.</td>
<td>Using UML design Adapter-object Design pattern</td>
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<tr>
<td>5.</td>
<td>Using UML design Strategy Design pattern</td>
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<td>6.</td>
<td>Using UML design Builder Design pattern</td>
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<td>7.</td>
<td>Using UML design Bridge Design pattern</td>
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<tr>
<td>8.</td>
<td>Using UML design Decorator Design pattern</td>
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<tr>
<td>9.</td>
<td>User gives a print command from a word document. Design to represent this chain of responsibility Design pattern</td>
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<tr>
<td>10.</td>
<td>Design a Flyweight Design pattern</td>
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<tr>
<td>11.</td>
<td>Using UML design Facade Design pattern</td>
</tr>
</tbody>
</table>
12. Using UML design Iterator Design pattern
13. Using UML design Mediator Design pattern
14. Using UML design Proxy Design pattern
15. Using UML design Visitor Design pattern
OBJECTIVES:
- To acquire knowledge of XHTML, Java Script and XML to develop web applications
- Ability to develop dynamic web content using Java Servlets and JSP
- To understand JDBC connections and Java Mail API
- To understand the design and development process of a complete web application

1. Design the following static web pages required for an online book store web site.

1) HOME PAGE:
The static home page must contain three frames.
Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame: At least four links for navigation, which will display the catalogue of respective links.
For e.g.: When you click the link “MCA” the catalogue for MCABooks should be displayed in the Right frame.
Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

<table>
<thead>
<tr>
<th>Logo</th>
<th>Web Site Name</th>
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<tbody>
<tr>
<td>Home</td>
<td>Login</td>
</tr>
<tr>
<td></td>
<td>Registration</td>
</tr>
<tr>
<td></td>
<td>Catalogue</td>
</tr>
<tr>
<td>mca</td>
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<tr>
<td>mba</td>
<td>Description of the Web Site</td>
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<td>BCA</td>
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2) Login page

<table>
<thead>
<tr>
<th>Logo</th>
<th>Web Site Name</th>
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<tbody>
<tr>
<td>Home</td>
<td>Login</td>
</tr>
<tr>
<td></td>
<td>Registration</td>
</tr>
<tr>
<td></td>
<td>Catalogue</td>
</tr>
<tr>
<td></td>
<td>Cart</td>
</tr>
<tr>
<td>MCA</td>
<td></td>
</tr>
<tr>
<td>MBA</td>
<td>Login: 11x510003</td>
</tr>
<tr>
<td>BCA</td>
<td>Password:</td>
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</tbody>
</table>

Submit    Reset
3) **CATALOGUE PAGE:**
The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:
2. Author Name.
3. Publisher.
5. Add to cart button.

<table>
<thead>
<tr>
<th>Logo</th>
<th>Web Site Name</th>
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</thead>
<tbody>
<tr>
<td>Home</td>
<td>Login</td>
</tr>
<tr>
<td>MBA</td>
<td>XML Bible</td>
</tr>
</tbody>
</table>
|      | Author: Winston
|      | Publication: Wiely |
| BCA  | AI           | $63          | Add to cart |
|      | Author: S. Russell
|      | Publication: PrincetonHall |
|      | Book: Java 2
|      | Author: Watson
|      | Publication: BPBPublications |
|      | Book: HTML in 24 hours
|      | Author: Sam Peter
|      | Publication: Sam |

4. **REGISTRATION PAGE:**
Create a “registration form” with the following fields
1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. **Design a web page using CSS (Cascading Style Sheets)** which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

6. **Write an XML** file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Write Ruby program reads a number and calculates the factorial value of it and prints the Same.

8. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window

14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passed' program

18. An example perl program to connect to a MySQL database table and executing simple commands.

19. Example PHP program for contacts page.

20. User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following:
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display “You are not an authenticated user”.
Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database(MySql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).
23. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

24. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.

25. HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time (i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.Invalidate()).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

OUTCOMES:
• Students will be able to develop static web sites using XHTML and Java Scripts
• To implement XML and XSLT for web applications
• Develop Dynamic web content using Java Servlets and JSP
• To develop JDBC connections and implement a complete Dynamic web application
DISTRIBUTED SYSTEMS

OBJECTIVES:
- Provides an introduction to the fundamentals of distributed computer systems, assuming
  the availability of facilities for data transmission, IPC mechanisms in distributed
  systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed
  Computing infrastructures with various computing principles

UNIT-I:
Characterization of Distributed Systems: Introduction, Examples of Distributed Systems,
Resource Sharing and the Web, Challenges.
Variations, Interface and Objects, Design Requirements for Distributed Architectures,

UNIT-II:
Interprocess Communication: Introduction, The API for the Internet Protocols- The
Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP
Stream Communication; External Data Representation and Marshalling; Client Server
Communication; Group Communication- IP Multicast- an implementation of group
communication, Reliability and Ordering of Multicast.

UNIT-III:
Distributed Objects and Remote Invocation: Introduction, Communication between
Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI,
Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and
Notifications, Case Study: JAVA RMI

UNIT-IV:
and Threads –Address Space, Creation of a New Process, Threads.

UNIT-V:
Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems:
Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.
 Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections,
Multicast Communication.

UNIT-VI:
Transactions & Replications: Introduction, System Model and Group Communication,
Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction
Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.
OUTCOMES:

- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used in distributed systems.
- Gaining practical experience of inter-process communication in a distributed environment

TEXT BOOKS:


REFERENCE BOOKS

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI
IV Year – II Semester

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MANAGEMENT SCIENCE

Course Objectives:
*To familiarize with the process of management and to provide basic insight into select contemporary management practices
*To provide conceptual knowledge on functional management and strategic management.

UNIT I

UNIT II
Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

UNIT IV
Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

Unit V

UNIT VI
Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.
**Course Outcome:**
*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.*
*Will familiarize with the concepts of functional management project management and strategic management.*

**Text Books**

**References:**
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
7. Hitt and Vijaya Kumar: Strategic Management, Cengage learning
OBJECTIVES:
- Familiarity with a set of well-known supervised, unsupervised and semi-supervised learning algorithms.
- The ability to implement some basic machine learning algorithms.
- Understanding of how machine learning algorithms are evaluated.

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. Binary classification and related tasks: Classification, Scoring and ranking, Class probability estimation.

UNIT - II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. Concept learning: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts.


OUTCOMES:
• Recognize the characteristics of machine learning that make it useful to real-world Problems.
• Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised.
• Have heard of a few machine learning toolboxes.
• Be able to use support vector machines.
• Be able to use regularized regression algorithms.
• Understand the concept behind neural networks for learning non-linear functions.

TEXT BOOKS:
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:
1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
OBJECTIVES:
• Improvement of students comprehension of CPP, new programming concepts, paradigms and idioms
• Change of ‘mood’ regarding Concurrency counter-intuitiveness
• Proactive attitude: theoretical teaching shouldn’t be so dull
• Multipath, individually paced, stop–and–replay, personalized learning process
• Frequent assessment of learning advances on the subject

UNIT- 1
Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronization primitives.

UNIT-II

UNIT-III
Parallel algorithms – sorting, ranking, searching, traversals, prefix sum etc.,

UNIT- IV
Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM,

UNIT-V
OpenMP, OpenCL, Cilk++, Intel TBB, CUDA

UNIT-VI
Heterogeneous Computing: C++AMP, OpenCL
OUTCOMES:

- Understanding improvement of CPP concepts presented
- The number of reinforcement–exercises assigned
- The time required for the resolution of exercises
- Compliance level with the new model of theoretical teaching

TEXT BOOKS:

ARTIFICIAL NEURAL NETWORKS
( Elective-3)

OBJECTIVES:
- Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
- Provide knowledge of supervised learning in neural networks
- Provide knowledge of computation and dynamical systems using neural networks
- Provide knowledge of reinforcement learning using neural networks.
- Provide knowledge of unsupervised learning using neural networks.
- Provide hands-on experience in selected applications

UNIT-I: Introduction and ANN Structure.
Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

UNIT-II

UNIT-III

UNIT-IV: Feed forward ANN.

UNIT-V: Radial Basis Function Networks.
Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks. RBF network design and training. Approximation properties of RBF.

UNIT-VI: Support Vector machines.
Linear separability and optimal hyperplane. Determination of optimal hyperplane. Optimal hyperplane for nonseparable patterns. Design of an SVM. Examples of SVM.
OUTCOMES:

- This course has been designed to offer as a graduate-level/final year undergraduate level elective subject to the students of any branch of engineering/science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
- Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/unsupervised) and regression.
- The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN. The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning.

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVE:

• Identify and develop operational research models from the verbal description of the real system.
• Understand the mathematical tools that are needed to solve optimisation problems.
• Use mathematical software to solve the proposed models.
• Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:

UNIT-V:
Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy.
UNIT-VI:
Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

OUTCOME:
- Linear programming: solving methods, duality, and sensitivity analysis.
- Integer Programming.
- Network flows.
- Multi-criteria decision techniques.
- Decision making under uncertainty and risk.
- Game theory. Dynamic programming.

TEXT BOOKS:

REFERENCE BOOKS:
IV Year – II Semester

SEMINAR

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IV Year – II Semester
COURSE STRUCTURE AND SYLLABUS

For

ELECTRONICS AND COMMUNICATION ENGINEERING
(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
### I Year - I Semester

<table>
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<th>S.No.</th>
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<td>1-HS</td>
<td>English - I</td>
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**Total Course Credits** = 48 + 44 + 42 + 46 = 180
Syllabus

I Year - I Semester

ENGLISH - I

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Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   (80% for the best of two and 20% for the other)
   Assignments= 5%
   End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches)and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17
The course content along with the study material is divided into six units.

UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

   OBJECTIVE:
   To develop human resources to serve the society in different ways.

   OUTCOME:
   The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

   OBJECTIVE:
   To develop extensive reading skill and comprehension for pleasure and profit.

   OUTCOME:
   Acquisition of writing skills

UNIT 2:

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

   OBJECTIVE:
   To highlight road safety measures whatever be the mode of transport.
OUTCOME:
The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 3:
1. 'Evaluating Technology' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the advantages and disadvantages of technology.

OUTCOME:
The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 4:
1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

OBJECTIVE:
To bring into focus different sources of energy as alternatives to the depleting sources.

OUTCOME:
The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading
OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the fact that animals must be preserved because animal life is precious.

OUTCOME:
The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 6:
1. 'Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

OUTCOME:
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.
OUTCOME:

Acquisition of writing skills

NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.

MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:
1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type \( e^{ax} \), \( \sin ax \), \( \cos ax \), polynomials in \( x \), \( e^{ax} V(x) \), \( xV(x) \)- Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT III: 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 (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:
Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables–Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).
UNIT V: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type \( e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n \). Classification of second order partial differential equations.

Text Books:


Reference Books:

3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

Unit-IV: Functions of a complex variable
Complex function , Real and Imaginary parts of Complex function, Limit, Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function, $C−R$ equations in polar form, Harmonic functions, Milne-Thomson method, Simple applications to flow problems,

Unit-V: Series Expansion and Complex Integration
Line integral of a complex function, Cauchy’s theorem(only statement ) , Cauchy’s Integral Formula. Absolutely convergent and uniformly convergent of series of complex terms, Radius of convergence, Taylor’s series, Maclaurin’s series expansion, Laurent’s series.

Unit-VI: Singularities and Residue Theorem
Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m, Evaluation of real definite integrals: Integration around the unit circle, Integration around semi circle, Indenting the contours having poles on the real axis.

Text Books:

Reference Books:
1. DEAN G. DUFFY, Advanced engineering mathematics with MATLAB, CRC Press
OBJECTIVES: Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUiv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

UNIT-I
INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II
DIFFRACTION: Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III
POLARIZATION: Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).


UNIT-IV
ELECTROMAGNETIC FIELDS: Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V

UNIT-VI
SEMICONDUCTOR PHYSICS: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein’s equation- Hall effect in semiconductors

Outcome: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.
**List of Text Books:**


**List of Reference Books:**

Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Introduction to C Programming- Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

UNIT-IV
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versusIteration.
UNIT-V:
Arrays & Strings
Arrays: One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:
Pointers, Structures, Files
Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.
Structures: Derived types, Structuresdeclaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.
Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, ReemaThareja, OXFORD.
Objective: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Unit I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

Unit II

Objective: To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP, VP or PP)

Unit III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

Unit IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.
Unit V

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Unit VI

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text Books:
1. Engineering Drawing by N.D. Butt, Chariot Publications

Reference Books:
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
OBJECTIVES:
To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
   Practice work.

UNIT 2:
1. Responding to Requests and asking for Directions
   Practice work.

UNIT 3:
1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:
1. Letters and Sounds
   Practice work.

UNIT 5:
1. The Sounds of English
   Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation

Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
<td>Grammar</td>
<td>Vocabulary &amp; expressions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a technical/mini-project/experimental report with scientific temper.
ENGINEERING WORKSHOP:
Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.
Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

IT WORKSHOP:
OBJECTIVES:
- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. Operating System Installation- Install Operating Systems like Windows, Linux along with necessary Device Drivers.
3. **MS-Office / Open Office**
   - **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.
   - **Spread Sheet** - organize data, usage of formula, graphs, charts.
   - **Power point** - features of power point, guidelines for preparing an effective presentation.
   - **Access** - creation of database, validate data.


5. **Internet and World Wide Web** - Search Engines, Types of search engines, netiquette, cyber hygiene.


7. **MATLAB** - basic commands, subroutines, graph plotting.

8. **LATEX** - basic formatting, handling equations and images.

**OUTCOMES:**
- Common understanding of concepts, patterns of decentralization implementation in Africa
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices
- Identified instruments for improved decentralization to the local level
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

**Text Books:**
5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.
WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   (80% for the best of two and 20% for the other)
   Assignments= 5%
   End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)
UNIT 1:

1. 'The Greatest Resource- Education' from English Encounters

OBJECTIVE:
Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

OUTCOME:
The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

OUTCOME:
Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:

1. 'A Dilemma' from English Encounters

OBJECTIVE: The lesson centres on the pros and cons of the development of science and technology.

OUTCOME: The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.
OBJECTIVE:
The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

OUTCOME:
The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:
1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

OBJECTIVE:
The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

OUTCOME:
The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

OUTCOME:
The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.

OBJECTIVE:
The lesson highlights insightful commentary on cultural traditions.

OUTCOME:
The theme projects society’s need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

OBJECTIVE:
The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.
UNIT 5:

1. 'The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:
The essay presents several health disorders that spring out due to environmental changes.

OUTCOME:
The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. 'Prafulla Chandra Ray' from The Great Indian Scientists.

OBJECTIVE:
The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:
Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:

1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:
The lesson supports the developments of technology for the betterment of human life.

OUTCOME:
Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:
The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.
MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A, B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:


UNIT II: Eigen values - Eigen vectors and Quadratic forms:


Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

Applications: Finding Areas and Volumes.

UNIT IV: Special functions:

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Applications: Evaluation of integrals.

UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators - Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Text Books:

Reference Books:
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries (Unit I).
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced (Unit II).
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory (Unit III).
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced (Unit IV).
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied (Unit V).
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced (Unit VI).

UNIT I: HIGH POLYMERS AND PLASTICS
Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)-Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates
Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

UNIT II: FUEL TECHNOLOGY

Explosives:- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

UNIT III: ELECTROCHEMICAL CELLS AND CORROSION
Galvanic cells - Reversable and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion:- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)
UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

**Nano materials:** Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

**Liquid crystals:** Introduction – Types – Applications

**Superconductors :** Type-I & Type-2, properties & applications

**Green synthesis:** Principles - 3 or 4 methods of synthesis with examples – R₄M₄ principles

UNIT V: SOLID STATE CHEMISTRY

Types of solids - close packing of atoms and ions - BCC , FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels.

Non-elemental **semiconducting Materials:** Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices: p-n junction diode as rectifier – junction transistor.

**Insulators** (electrical and electronic applications)

**Magnetic materials:** Ferro and ferri magnetism. Hall effect and its applications.

UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

**Solar Energy:** Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

**Non-conventional energy sources:**

(i) Hydropower include setup a hydropower plant (schematic diagram)

(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant

(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.

(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.

(v) Biomass and biofuels

**Fuel cells:** Introduction - cell representation, H₂-O₂ fuel cell: Design and working, advantages and limitations.

Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

**Outcomes:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.
**Standard Books:**
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

**Reference Books:**
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
ELECTRICAL TECHNOLOGY:

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:
• To learn the basic principles of electrical law’s and analysis of networks.
• To understand the principle of operation and construction details of DC machines.
• To understand the principle of operation and construction details of transformer.
• To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
• To understand the performance of transformer.

Unit - I
DC Machines:
Principle of operation of DC generator – emf equation – types of DC machine – torque equation of DC motor – applications – three point starter, speed control methods – OCC of DC generator

Transformers:
Principle of operation of single phase transformers – e.m.f equation – losses – efficiency and regulation.

Unit - II
AC Rotating Machines:

Unit III
Measuring Instruments:
Classification – Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments – Energy meter – Construction of CRO.

Learning Outcomes:
• Able to analyse the various electrical networks.
• Able to understand the operation of DC generator, DC Motor ,3-point starter and Speed control methods.
• Able to analyse the performance of transformer.
• Able to explain the operation of 3-phase alternator and 3-phase induction motors.
• Able to explain the working principle of various measuring instruments.
MECHANICAL TECHNOLOGY

Learning Objectives: The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamental principles of fuels, I.C. Engines, transmission systems, heat transfer fundamentals and various manufacturing operations usually exist in any process plant.

UNIT-IV:

Energy Sources: Renewable and non renewable energy resources, renewable energy forms and conversions. Thermodynamic principles and laws.


UNIT-V:


UNIT-VI:

Transmission of power and manufacturing methods:

Belt, rope and chain drives- Different types - power transmission by belts and ropes, initial tensions in the belt.

Gears: classification of gears, applications.

Metal joining: arc welding, resistance welding, gas welding, brazing and soldering

Metal forming: forging – operations, rolling and extrusion principles

Machine tool: lathe classification, specifications, and operations.

Outcomes:

After completing the course, the student shall be able to understand:

- Working of I.C. Engines
- Modes of Heat transfer
- Power transmission by drives and different manufacturing methods.
**Text Books:**

2. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group
3. Mechanical Engineering Science K R Gopala Krishna, Subhas publications

**Reference Books:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
4. Electrical Engineering – Prasad, Sivanagaraju, Cengage Learning
5. Theory of machines by Rattan   McGraw-Hill publications
6. Production Technology by P.N.Rao by I & II McGraw-Hill publications
Course Learning Objectives:
The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.
UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.


UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.


The student should Visit an Industry/Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.
Text Books:
1. Environmental Studies, K.V. S. G. Murali Krishna, VGS Publishers, Vijayawada

Reference:
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
OBJECTIVES:

- To be familiar with basic techniques handling problems with Data structures
- Solve problems using data structures such as linear lists, stacks, queues, hash tables

UNIT-I: ARRAYS

UNIT-II: STACKS AND QUEUES
The Stack Abstract Data Type, The Queue Abstract Data Type, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

UNIT-IV: TREES
Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

UNIT-V: GRAPHS
The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm, Sollin’s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.
UNIT-VI: SORTING
Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort,
Summary of Internal Sorting

OUTCOMES:

• Apply advanced data structure strategies for exploring complex data structures.

• Compare and contrast various data structures and design techniques in the area
  Of Performance.

• Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and
  trade offs

Text Books:
1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd

Reference Books:
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na$_2$CO$_3$ solution.

3. Determination of alkalinity of a sample containing Na$_2$CO$_3$ and NaOH.

4. Determination of KMnO$_4$ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K$_2$Cr$_2$O$_7$ solution.

6. Determination of Copper using standard K$_2$Cr$_2$O$_7$ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
Reference Books

OBJECTIVES:
To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
1. Debating - Practice work

UNIT 2:
1. Group Discussions -- Practice work

UNIT 3:
1. Presentation Skills - Practice work

UNIT 4:
1. Interview Skills - Practice work

UNIT 5:
1. Email, Curriculum Vitae - Practice work

UNIT 6:
1. Idiomatic Expressions
2. Common Errors in English - Practice work
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVES:

• Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

• Acquire knowledge about the basic concept of writing a program.

• Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

• Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

• Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
**Exercise -13 Files**
a) Write a C programming code to open a file and to print its contents on screen.
b) Write a C program to copy files

**Exercise - 14 Files Continued**
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

**OUTCOMES:**

- Apply and practice logical ability to solve the problems.

- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs

- Understand and apply the in-built functions and customized functions for solving the problems.

- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

- Document and present the algorithms, flowcharts and programs in form of user-manuals

- Identification of various computer components, Installation of software

**Note:**

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.
Objectives:

The main objectives of this course are:

- The basic concepts of semiconductor physics are to be reviewed.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- The application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- The principal of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics are explained.
- The need of transistor biasing and its significance is explained. The quiescent point or operating point is explained.
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers in different configuration is explained.

Syllabus:

UNIT-I: Semiconductor Physics: Insulators, Semiconductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

UNIT-II: Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Tunnel Diode, SCR, UJT. Construction, operation and characteristics of all the diodes are required to be considered.

UNIT-III: Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors.

UNIT-IV: Transistor Characteristics:

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

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.
UNIT- V: Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in $V_{BE}$, $Ic$, and $\beta$, Stability factors, ($S$, $S'$, $S''$), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

UNIT- VI: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

Text Books:


References:

3. Electronic Devices and Circuits – Bell, Oxford

Outcomes:

At the end of this course the student can able to:

- Understand the basic concepts of semiconductor physics.
- Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
- Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
- Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
- Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.
UNIT – I: REVIEW OF NUMBER SYSTEMS & CODES:
   i) Representation of numbers of different radix, conversation from one radix to another radix, r-1’s compliments and r’s compliments of signed members, problem solving.
   ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc.,
   iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

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

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

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

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

UNIT – VI: SEQUENTIAL CIRCUITS II
   Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.
TEXT BOOKS:
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

REFERENCE BOOKS:
1. Modern Digital Electronics by RP Jain, TMH
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
OBJECTIVES:
The main objectives of this course are given below:
• To introduce the terminology of signals and systems.
• To introduce Fourier tools through the analogy between vectors and signals.
• To introduce the concept of sampling and reconstruction of signals.
• To analyze the linear systems in time and frequency domains.
• To study z-transform as mathematical tool to analyze discrete-time signals and systems.


UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet’s conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT –III: SAMPLING THEOREM – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-IV: ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s, Relation between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

TEXT BOOKS:


REFERENCE BOOKS:


OUTCOMES:

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

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.
UNIT – I
Network Topology: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

UNIT – II

UNIT – III
Coupled Circuits: Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.
Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

UNIT – IV
Network Theorems: Thevinin’s, Norton’s, Milliman’s, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

UNIT – V
Two-port networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)
UNIT – VI

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

TEXT BOOKS:
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

REFERENCES:
2. Basic Circuit Analysis by DR Cunningham, Jaico Publishers.

COURSE OBJECTIVES:
1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady states and transients states in RLC circuits.
3. To know the basic Laplace transforms techniques in periods’ waveforms.
4. To understand the two port network parameters.
5. To understand the properties of LC networks and filters.

COUSE OUTCOME:
1. gain the knowledge on basic network elements.
2. will analyze the RLC circuits behavior in detailed.
3. analyze the performance of periodic waveforms.
4. gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
5. analyze the filter design concepts in real world applications.
OBJECTIVES:

- To give students an introduction to elementary probability theory, in preparation for courses on statistical analysis, random variables and stochastic processes.
- To mathematically model the random phenomena with the help of probability theory concepts.
- To introduce the important concepts of random variables and stochastic processes.
- To analyze the LTI systems with stationary random process as input.
- To introduce the types of noise and modelling noise sources.

UNIT I

UNIT II

UNIT III
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

UNIT V
UNIT VI

TEXT BOOKS:

REFERENCE BOOKS:
5. Random Process – Ludeman, John Wiley

OUTCOMES:

After completion of the course, the student will be able to
- Mathematically model the random phenomena and solve simple probabilistic problems.
- Identify different types of random variables and compute statistical averages of these random variables.
- Characterize the random processes in the time and frequency domains.
- Analyze the LTI systems with random inputs.
- Apply these techniques to analyze the systems in the presence of different types of noise.
Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.

- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.

- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II
Production and Cost Analyses:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III
Introduction to Markets, Theories of the Firm & Pricing Policies:

UNIT – IV
Types of Business Organization and Business Cycles:

UNIT – V
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)
UNIT – VI
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money-Methods of appraising Project profitability: Traditional Methods (pay back period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Course Outcome:
* The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
* The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

TEXT BOOKS

REFERENCES:
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

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

List of Experiments: (Minimum of Ten Experiments has to be performed)

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

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
Learning Objectives:
- To determine resonance frequency, Q-factor of RLC network.
- To analysis time response of first orders RC/RL network for non-sinusoidal inputs.
- To estimate parameters of two port networks
- To understand the concept network theorems in network reduction of electrical networks.
- To determine efficiency of dc shunt machine with actual loading.
- To analyse performance of 3 phase induction motor
- To understand the significance of regulation of an alternators through synchronous impedance method.

PART – A
Any five experiments are to be conducted from each part
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin’s and Norton’s equivalent circuits and verification by direct test.

PART – B
2. Speed control of D.C. Shunt motor by Armature & flux control methods
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method

Learning Outcomes:
- Able to analyse RLC circuits and understand resonant frequency and Q-factor.
- Able to determine first order RC/RL networks of periodic non-sinusoidal waveforms.
- Able to apply network theorems to analyze the electrical network.
- Able to describe the performance of dc shunt machine.
- Able to investigate the performance of 1-phase transformer.
- Able to perform tests on 3-phase induction motor and alternator to determine their performance characteristic
Objectives:

The main objectives of this course are:

- Small signal high frequency BJT transistor amplifier Hybrid-\(\pi\) equivalent circuit and the expressions for conductances and capacitances are derived.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Basic principle of oscillator circuits is explained and different oscillator circuits are given with their analysis.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.
- Different types of tuned amplifier circuits are analyzed.

Outcomes:

At the end of this course the student can able to:

- Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
- Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT.
- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
- Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

Syllabus:

UNIT-I  Small Signal High Frequency Transistor Amplifier models:

BJT: Transistor at high frequencies, Hybrid-\(\pi\) common emitter transistor model, Hybrid \(\pi\) conductances, Hybrid \(\pi\) capacitances, validity of hybrid \(\pi\) model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II  Multistage Amplifiers: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.
UNIT -III
Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

Unit-IV

UNIT-V
Power Amplifiers: Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers.

UNIT-VI
Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

Text Books:


References:

CONTROL SYSTEMS

Course objectives

1. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback

2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis

3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices

4. To analyze the system in terms of absolute stability and relative stability by different approaches

5. To design different control systems for different applications as per given specifications

6. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability

UNIT-1
Introduction
System Control System, Open Loop Control System, Closed loop Control System, Different Examples
Mathematical models of Physical Systems
Differential equations of physical systems, Transfer functions, Block diagram Algebra, Signal flow graphs with illustrative examples
Effects of Feedback
Feedback Characteristics and its advantages, Linearizing effect of feedback

UNIT-2
Controller Components
DC Servomotor (Armature Controlled and Field Controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function, AC Tachometer, Potentiometer, Synchros, AC Position Control Systems
Time Response Analysis
Standard test Signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices

UNIT-3
Concepts of Stability and Algebraic Criteria
The concept of Stability, Necessary Conditions for Stability, Routh-Hurwitz Stability Criterion, Relative stability analysis,
The Root Locus Technique
Introduction, The Root Locus concepts, Construction of Root Loci
UNIT-4
Frequency response analysis
Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion

UNIT-5
Introduction to Design
The design problem, Preliminary consideration of classical design, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, Tuning of PID Controllers

UNIT-6
State Variable Analysis and Design

Text Book

Reference Books

Course Outcomes
1. This course introduces the concepts of feedback and its advantages to various control systems
2. The performance metrics to design the control system in time-domain and frequency domain are introduced.
3. Control systems for various applications can be designed using time-domain and frequency domain analysis.
4. In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
OBJECTIVES:

The main objectives of this course are to understand:

1. Fundamentals of steady electric and magnetic fields using various laws
2. The concept of static and time varying Maxwell equations and power flow using pointing theorem
3. Wave characteristics in different media for normal and oblique incidence
4. Various concepts of transmission lines and impedance measurements

SYLLABUS:

UNIT I:


UNIT III: EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types. Illustrative Problems. [1,2,3]


UNIT VI: Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements; Impedance Transformations λ/4, λ/2, λ/8 Lines –. Smith Chart – Construction and Applications, Quarter wave transformer, Stub Matching-single & double, Illustrative Problems. [1,7]
TEXT BOOKS:


REFERENCE BOOKS:

4. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao, Wiley India 2013

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OUTCOMES:
At the end of this course the student can able to:

1. Determine E and H using various laws and applications of electric & magnetic fields
2. Apply the Maxwell equations to analyze the time varying behavior of EM waves
3. Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
4. Calculate Brewster angle, critical angle and total internal reflection
5. Derive the expressions for input impedance of transmission lines
6. Calculate reflection coefficient, VSWR etc. using smith chart
UNIT I
AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

UNIT III

UNIT IV

UNIT V

UNIT VI
PULSE MODULATION: Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM.
TEXT BOOKS:


REFERENCES:


Course Objectives:

Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Develop the ability to classify and understand various functional blocks of radio transmitters and receivers
5. Familiarize with basic techniques for generating and demodulating various pulse modulated signals

Course Outcomes:

After undergoing the course, students will be able to

1. Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
2. Analyze noise characteristics of various analog modulation methods
3. Analyze various functional blocks of radio transmitters and receivers
4. Design simple analog systems for various modulation techniques.
OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

UNIT I
LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II
NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; 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 as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

UNIT IV

UNIT V
VOLTAGE TIME BASE GENERATORS: General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.

UNIT VI
LOGIC FAMILIES & SAMPLING GATES:
TEXT BOOKS:
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005

REFERENCES:
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

OUTCOMES
After going through this course the student will be able to
• Design linear and non-linear wave shaping circuits.
• Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
• Design different multivibrators and time base generators.
• Utilize the non sinusoidal signals in many experimental research areas.
**II Year - II Semester**

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**MANAGEMENT SCIENCE**

Course Objectives:
*To familiarize with the process of management and to provide basic insight into select contemporary management practices*
*To provide conceptual knowledge on functional management and strategic management.*

**UNIT I**
**Introduction to Management:** Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology - International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

**UNIT II**
**Operations Management:** Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

**UNIT III**
**Functional Management:** Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

**UNIT IV**
**Project Management:** (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**UNIT V**

**UNIT VI**
**Contemporary Management Practice:** Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Course Outcome:
*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.*
*Will familiarize with the concepts of functional management project management and strategic management.*
Text Books
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, ‘Management Science’ Cengage, Delhi, 2012.

References
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
7. Hitt and Vijaya Kumar: Strategic Management, Cengage learning
ELECTRONIC CIRCUIT ANALYSIS LAB

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

List of Experiments :( Minimum of Ten Experiments has to be performed)

1. Determination of $f_T$ of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt’s Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment required:

Software:
   i. Multisim/ Equivalent Industrial Standard Licensed simulation software tool.
   ii. Computer Systems with required specifications

Hardware:

10. Regulated Power supplies
11. Analog/Digital Storage Oscilloscopes
12. Analog/Digital Function Generators
13. Digital Multimeters
14. Decade Résistance Boxes/Rheostats
15. Decade Capacitance Boxes
16. Ammeters (Analog or Digital)
17. Voltmeters (Analog or Digital)
18. Active & Passive Electronic Components
List of Experiments (Twelve experiments to be done- The students have to calculate the relevant parameters) -
(a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box)

A. Amplitude Modulation - Mod. & Demod.
B. AM - DSB SC - Mod. & Demod.
C. Spectrum Analysis of Modulated signal using Spectrum Analyser
D. Diode Detector
E. Pre-emphasis & De-emphasis
F. Frequency Modulation - Mod. & Demod.
G. AGC Circuits
H. Sampling Theorem
I. Pulse Amplitude Modulation - Mod. & Demod.
J. PWM, PPM - Mod. & Demod.
K. PLL
L. Radio receiver characteristics

Equipments & Software required:

Software:

i.) Computer Systems with latest specifications
ii) Connected in Lan (Optional)
iii) Operating system (Windows XP)
iv) Simulations software (Simulink & MATLAB)

Equipment:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multimeters
6. Spectrum Analyser
OBJECTIVES:

- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- In addition to this the memory management system of computer.

UNIT -I:

UNIT -II:
Machine Instruction and Programs:
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,
Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:
Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes,
Input/output Operations

UNIT -IV:
INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,
Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT -V:
The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory,
Cache Memories: Mapping Functions, INTERLEAVING
Secondary Storage: Magnetic Hard Disks, Optical Disks,

UNIT -VI:
Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation,
Fetching A Word From Memory,
Execution of Complete Instruction, Hardwired Control,
Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field
OUTCOMES:
- Students can understand the architecture of modern computer.
- They can analyze the performance of a computer using performance equation.
- Understanding of different instruction types.
- 4. Students can calculate the effective address of an operand by addressing modes.
- 5. They can understand how computer stores positive and negative numbers.
- 6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES

- To understand the basic operation & performance parameters of differential amplifiers.
- To understand & learn the measuring techniques of performance parameters of OP-AMP.
- To learn the linear and non-linear applications of operational amplifiers.
- To understand the analysis & design of different types of active filters using opamps.
- To learn the internal structure, operation and applications of different analog ICs.
- To acquire skills required for designing and testing integrated circuits.

UNIT I
INTEGRATED CIRCUITS:

- Differential Amplifier - DC and AC analysis of Dual input Balanced output Configuration.
- DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT II

- Characteristics of OP-Amps, Integrated circuits - Types, Classification, Package Types and Temperature ranges.
- DC and AC characteristics, 741 op-amp & its features.
- Slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

UNIT III
LINEAR and NON-LINEAR APPLICATIONS OF OP-AMPS:

- Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier.
- V to I, I to V converters, Buffers.
- Non-Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

UNIT IV
ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS:

- Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters.
- Band pass, Band reject and all pass filters.
- Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

UNIT V
TIMERS & PHASE LOCKED LOOPS:

- Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications.
- Schmitt Trigger; PLL - introduction, block schematic, principles and description of individual blocks.
- 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.
- Applications of VCO (566).

UNIT VI
DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS:

- Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC.
- Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.
- DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).
TEXT BOOKS:

REFERENCES:
3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cengage Learning India Ltd.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

OUTCOMES

- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.
OBJECTIVES

The main objectives of this course are:

- Introduction of digital logic families and interfacing concepts for digital design is considered.
- VHDL fundamentals were discussed to modeling the digital system design blocks.
- VHDL compilers, simulators and synthesis tools are described, which are used to verify digital systems in a technology-independent fashion.
- Design and implementation of combinational and sequential digital logic circuits is explained.

Outcomes:

At the end of this course the student can able to:

- Understand the structure of commercially available digital integrated circuit families.
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
- Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.

Syllabus:

UNIT-I

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

(Text book-1)

UNIT-II

Introduction to VHDL: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling.

(Text book-2)

UNIT-III


(Text book-2)
UNIT-IV
**Combinational Logic Design:** Binary Adder-Subtractor, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder. Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

*(Text book-1)*

UNIT-V
**Sequential Logic Design:** SSI Latches and flip flops, Ring Counter, Johnson Counter, Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

*(Text book-1)*

UNIT-VI:
**Synchronous and Asynchronous Sequential Circuits:** Basic design steps: State diagram, state table, state assignment, choice of flip flops and derivation of next state and output expressions, timing diagram. State assignment problem: One hot encoding. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder. Analysis of Asynchronous circuits, State Reduction, State Assignment. A complete design example: The vending machine controller.

*(Reference text book-1)*

**Text Books:**


**References:**

UNIT I
PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital
communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Comping in
PCM systems. Differential PCM systems (DPCM). Delta modulation, its drawbacks, adaptive delta modulation,
comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II
DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary
PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III
DATA TRANSMISSION : Base band signal receiver, probability of error, the optimum filter, matched filter,
probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error
probability of ASK, BPSK, BFSK, QPSK.

UNIT IV
INFORMATION THEORY: Discrete messages, concept of amount of information and its properties. Average
information, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT V
SOURCE CODING: Introductions, Advantages, Shannon’s theorem, Shannon-Fano coding, Huffman coding,
efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel,
bandwidth –S/N trade off.

UNIT VI
LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error
correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding,
syndrome calculation, BCH Codes.
CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform

TEXT BOOKS:
1. Digital communications - Simon Haykin, John Wiley, 2005

REFERENCES:
Students undergoing this course are expected to:

**Course Objectives:**

1. Understand different pulse digital modulation techniques and their comparison
2. Familiarize various digital modulation techniques and calculation of their error probabilities
3. Understand the concept of entropy and different source coding techniques
4. Familiarize with block codes, cyclic codes and convolutional codes

**Course Outcomes:**

After undergoing the course students will be able to:

1. Determine the performance of different waveform coding techniques for the generation and digital representation of the signals.
2. Determine the probability of error for various digital modulation schemes
3. Analyze different source coding techniques
4. Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel.
OBJECTIVES

The student will be able to

- understand the applications of the electromagnetic waves in free space.
- introduce the working principles of various types of antennas
- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- understand the concepts of radio wave propagation in the atmosphere.

UNIT I
ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II
THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and R relations for small loops.

UNIT III

UNIT IV
UNIT V

UNIT VI

TEXT BOOKS

REFERENCES

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

- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna’s performance
- Identify the characteristics of radio wave propagation
1. Linear wave shaping.

2. Non Linear wave shaping – Clippers.

3. Non Linear wave shaping – Clampers.

4. Transistor as a switch.

5. Study of Logic Gates & Some applications.

6. Study of Flip-Flops & some applications.

7. Sampling Gates.

8. Astable Multivibrator.


12. UJT Relaxation Oscillator.


Equipment required for Laboratory:

1. RPS - 0 – 30 V

2. CRO - 0 – 20 M Hz.

3. Function Generators - 0 – 1 M Hz

4. Components

5. Multi Meters
Minimum Twelve Experiments to be conducted:

2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPS.
8. IC 555 Timer – Monostable Operation Circuit.
9. IC 555 Timer – Astable Operation Circuit.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components: IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester
The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

**List of Experiments**: (Minimum of Ten Experiments has to be performed)

1. Realization of Logic Gates
2. Design of Full Adder using 3 modeling systems
3. 3 to 8 Decoder -74138
4. 8 to 3 Encoder (with and without parity)
5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
6. 4- Bit comparator-7485
7. D Flip-Flop-7474
8. Decade counter -7490
9. Shift registers-7495
10. 8-bit serial in-parallel out and parallel in-serial out
11. Fast In & Fast Out (FIFO)
12. MAC (Multiplier & Accumulator)
13. ALU Design.

**Equipment/Software required:**

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware
3. Personal computer system with necessary software to run the programs and Implement.
Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:

UNIT: II: Principles for Harmony:

UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

UNIT V: Engineers’ Duties and Rights:

UNIT VI: Global Issues:

- Related Cases Shall be dealt where ever necessary.
Outcome:

*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
III Year - II Semester

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MICROPROCESSORS AND MICROCONTROLLERS

UNIT-I:
8086 ARCHITECTURE: Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architecture, bus interfacing unit, execution unit, interrupts and interrupt responses, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II:
8086 PROGRAMMING: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III:
8086 INTERFACING: Semiconductor memories interfacing (RAM,ROM), 8254 software programmable timer/counter, Intel 8259 programmable interrupt controller, software and hardware interrupt applications, Intel 8237a DMA controller, Intel 8255 programmable peripheral interface, keyboard interfacing, alphanumeric displays (LED,7-segment display, multiplexed 7-segment display, LCD), Intel 8279 programmable keyboard/display controller, stepper motor, A/D and D/A converters.

UNIT-IV:
80386 AND 80486 MICROPROCESSORS: Introduction, programming concepts, special purpose registers, memory organization, moving to protected mode, virtual mode, memory paging mechanism, architectural differences between 80386 and 80486 microprocessors.

UNIT-V:
Intel 8051 MICROCONTROLLER: Architecture, hardware concepts, input/output ports and circuits, external memory, counters/timers, serial data input/output, interrupts. Assembly language programming: Instructions, addressing modes, simple programs. Interfacing: keyboard, displays (LED, 7-segment display unit), A/D and D/A converters.

UNIT-VI:

Text Books:

References:
OBJECTIVES
The student will
- Understand fundamental characteristics of waveguides and Microstrip lines through electromagnetic field analysis.
- Understand the basic properties of waveguide components and Ferrite materials composition
- Understand the function, design, and integration of the major microwave components oscillators, power amplifier.
- Understand a Microwave test bench setup for measurements.

UNIT I

UNIT II
MICROSTRIP LINES– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

UNIT III

UNIT - IV
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants(Qualitative treatment).
M-type Tubes
Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.
UNIT V

UNIT VI

TEXT BOOKS:

REFERENCES:
4. Microwave Engineering – G S N Raju, I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson

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

- Design different modes in waveguide structures
- Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
- Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
- Measure various microwave parameters using a Microwave test bench
Objectives:

The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

Outcomes:

At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

Syllabus:

UNIT-I:
Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. \( I_{ds} \) versus \( V_{ds} \) Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.

(Text Book-1)

UNIT-II:

(Text Book-1)

UNIT-III:

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)
UNIT-IV:

**Design for Testability:** Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.  
*(Text Book-2)*

UNIT-V:
**FPGA Design:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

**Introduction to synthesis:** Logic synthesis, RTL synthesis, High level Synthesis.  
*(Reference Text Book-1)*

UNIT-VI:
**Introduction to Low Power VLSI Design:** Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Overview of power consumption, Low-power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance, Interconnect Design, Power Grid and Clock Design.  
*(Text Book-2)*

**Text Books:**


**References:**

1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
OBJECTIVES

The student will be able to

- Analyze the Discrete Time Signals and Systems
- Know the importance of FFT algorithm for computation of Discrete Fourier Transform
- Understand the various implementations of digital filter structures
- Learn the FIR and IIR Filter design procedures
- Know the need of Multirate Processing
- Learn the concepts of DSP Processors

UNIT I    INTRODUCTION:

UNIT II    DISCRETE FOURIER SERIES & FOURIER TRANSFORMS:

UNIT III    DESIGN OF IIR DIGITAL FILTERS & REALIZATIONS:
Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

UNIT IV    DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS:
Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters. Basic structures of FIR systems, Lattice structures, Lattice-ladder structures

UNIT V    MULTIRATE DIGITAL SIGNAL PROCESSING:

UNIT VI    INTRODUCTION TO DSP PROCESSORS:
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripheral. Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On-chip memory, On-chip peripherals.
TEXT BOOKS:

Reference Books:

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

• Apply the difference equations concept in the anayziation of Discrete time systems
• Use the FFT algorithm for solving the DFT of a given signal
• Design a Digital filter (FIR&IIR) from the given specifications
• Realize the FIR and IIR structures from the designed digital filter.
• Use the Multirate Processing concepts in various applications(eg: Design of phase shifters, Interfacing of digital systems…)
• Apply the signal processing concepts on DSP Processor.
OBJECTIVES:
- Understanding the OOP’s concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development.

UNIT-I:
Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.
Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II:
Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III:
Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class.
Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

UNIT-V:
Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-VI:

OUTCOMES:
- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
• Identify and Analyze Enterprise applications.

TEXT BOOKS:
1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.

REFERENCE BOOKS:
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.
DATA MINING
OPEN ELECTIVE

OBJECTIVES:

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT –I

UNIT –II
Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV
Classification: Alternative Techniques, Bayes’ Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V
Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

UNIT –VI

OUTCOMES:

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms
**TEXT BOOKS:**
1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

**REFERENCE BOOKS:**
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
Course Objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I

UNIT – II

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV
Differential transformation and manipulators, Jacobians – problems

UNIT V
General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VI
ROBOT ACTUATORS AND FEED BACK COMPONENTS:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
TEXT BOOKS:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:

Course outcomes:
Upon successful completion of this course you should be able to:
1. Identify various robot configuration and components,
2. Select appropriate actuators and sensors for a robot based on specific application
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains
4. Perform trajectory planning for a manipulator by avoiding obstacles.
POWER ELECTRONICS
(Open Elective)

Preamble:
The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:
• To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
• To understand the operation of single phase half wave and full–wave converters
• To understand the operation of different types of DC-DC converters.
• To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
• To understand the operation of AC-AC converters and switch mode power supplies operation.

UNIT–I
Power Semi-Conductor Devices
Thyristors–Silicon controlled rectifiers (SCR’s) – Characteristics of power MOSFET and power IGBT – Basic theory of operation of SCR–Static characteristics – Turn on and turn off methods–Dynamic characteristics of SCR – Snubber circuit design – Firing circuits for SCR

UNIT–II
AC-DC Single-Phase Converters

UNIT–III
DC–DC Converters

UNIT – IV
DC–AC Converters

UNIT – V
AC – AC Single-Phase Converters
Static V-I characteristics of TRIAC and modes of operation – Single phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction – Principle of operation of Cyclo-Converters

UNIT – VI
Switch Mode Power Supplies
Overview of Switching Power Supplies – Linear Power Supplies – DC to DC converters with electrical isolation – Control of Switch Mode DC Supplies – PWM duty ratio control – Current mode control – Power Supply Protection
Learning Outcomes:
Student should be able to
- Explain the characteristics of various power semiconductor devices and analyse the static and dynamic characteristics of SCR’s.
- Design firing circuits for SCR.
- Able to explain the operation of single phase half wave and full-wave converters
- Analyse the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyse the operation of AC-AC converters.
- Able to explain switch mode power supplies operation and control

Text Books:

Reference Books:
1. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
2. Elements of Power Electronics–Philip T.Krein.oxford.
UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:
PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

UNIT-V:
UNIT-VI:
MONITORS, RECORDERS AND SHOCK HAZARDS: Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books:


References:

ARTIFICIAL NEURAL NETWORKS
OPEN ELECTIVE

Course Objectives:
1. To introduce the concept of Artificial Neural Networks, Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence
2. To study the basics of Pattern Recognition and Feed forward Neural Networks
3. To study the basics of Feedback neural networks and Boltzmann machine
4. To introduce the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks
5. To study the Stability, Plasticity, Neocognitron and Different applications of Neural Networks

UNIT-I: Basics of Artificial Neural Networks
Introduction: Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Topology, Basic Learning Rules
Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks

UNIT-II: Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units
Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT-III:
Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine

UNIT-IV:
Competitive Learning Neural Networks: Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network

UNIT-V:
Architectures for Complex Pattern Recognition Tasks: Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI:
Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making
Text Book
1. B.Yagnanarayana“Artificial Neural Networks”, PHI

Reference Book
1. Laurene Fausett ,“Fundamentals of Neural Networks”, Pearson Education

Course Outcomes
1. This Course introduces Artificial Neural Networks and Learning Rules and Learning methods
2. Feed forward and Feedback Neural Networks are introduced
3. Applications of Neural Networks in different areas are introduced
LIST OF EXPERIMENTS

PART- A: (Minimum of 5 Experiments has to be performed)
8086 Assembly Language Programming using Assembler Directives
  15. Sorting.
  16. Multibyte addition/subtraction
  17. Sum of squares/cubes of a given n-numbers
  18. Addition of n-BCD numbers
  19. Factorial of given n-numbers
  20. Multiplication and Division operations
  21. Stack operations
  22. BCD to Seven segment display codes

PART- B: (Minimum of 3 Experiments has to be performed)
8086 Interfacing
  1. Hardware/Software Interrupt Application
  2. A/D Interface through Intel 8255
  3. D/A Interface through Intel 8255
  4. Keyboard and Display Interface through Intel 8279
  5. Generation of waveforms using Intel 8253/8254

PART- C: (Minimum of 3 Experiments has to be performed)
8051 Assembly Language Programs
  1. Finding number of 1’s and number of 0’s in a given 8-bit number
  2. Addition of even numbers from a given array
  3. Ascending / Descending order
  4. Average of n-numbers

PART- D: (Minimum of 3 Experiments has to be performed)
8051 Interfacing
  1. Switches and LEDs
  2. 7-Segment display (multiplexed)
  3. Stepper Motor Interface
  4. Traffic Light Controller
Equipment Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module
6. DAC module
7. Stepper motor module
8. Keyboard module
9. LED, 7-Segment Units
10. Digital Multimeters
11. ROM/RAM Interface module
12. Bread Board etc.
Note: The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

List of Experiments:

i. Design and Implementation of an Universal Gates
ii. Design and Implementation of an Inverter
iii. Design and Implementation of Full Adder
iv. Design and Implementation of Full Subtractor
v. Design and Implementation of Decoder
vi. Design and Implementation of RS-Latch
vii. Design and Implementation of D-Latch
viii. Design and Implementation asynchronous counter
ix. Design and Implementation of static RAM cell
x. Design and Implementation of 8 bit DAC using R-2R latter network

Software Required:

ii. Personal computer system with necessary software to run the programs and to implement.
### III Year - II Semester

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1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code – Encoder and Decoder
12. Convolution Code – Encoder and Decoder

**Equipment required for Laboratories:**
1. RPS – 0 – 30 V
2. CRO – 0 – 20 M Hz.
3. Function Generators – 0 – 1 M Hz
4. RF Generators – 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
UNIT I: Introduction to Intellectual Property Rights (IPR)

UNIT II: Copyrights and Neighboring Rights

UNIT III: Patents

UNIT IV: Trademarks

UNIT V: Trade Secrets

UNIT VI: Cyber Law and Cyber Crime

- Relevant Cases Shall be dealt where ever necessary.
References:
6. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
OBJECTIVES
The student will be introduced to:
1. The Basic Principle of radar and radar range equation.
2. Different types of radars; CW, FM-CW, MTI and pulse Doppler radars.
3. Understand the different tracking techniques for radar.
4. Understand the characteristics of a matched filter receiver and its performance.
5. Understand the different types of displays, duplexers and antennas used in radar systems.

UNIT–I:

Radar Equation: Modified Radar Range Equation, SNR, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT–II:
CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems


UNIT–III:

UNIT –IV:
Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:

UNIT –VI:
TEXT BOOKS:

REFERENCE BOOKS:
1. Introduction to Radar Systems, 3\textsuperscript{rd} edition – M.I. Skolnik, TMH Ed., 2005
4. Principles of Modern Radar: Basic Principles – Mark A. Richards, James A. Scheer, William A. Holm, Yesdee,

OUTCOMES
After going through this course the student will be able to:
1. Derive the radar range equation and to solve some analytical problems.
2. Understand the different types of radars and its applications.
3. Understand the concept of tracking and different tracking techniques.
4. Understand the various components of radar receiver and its performance.
UNIT-1
Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms

UNIT-2
Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods

Filtering in the Frequency Domain: Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-3
Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering. Minimum mean square error (Wiener) filtering, constrained least squares filtering, geometric mean filter, image reconstruction from projections.

UNIT-4
Image compression: Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding

Wavelets and Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-5
Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation.

Morphological Image Processing: Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.

UNIT-6
Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.
Text Books

Reference Books

Course Objectives:

Students undergoing this course are expected to:

1. Familiarize with basic concepts of digital image processing and different image transforms
2. Learn various image processing techniques like image enhancement, restoration, segmentation and compression
3. Understand color fundamentals and different color models
4. Understand wavelets and morphological image processing

Course Outcomes:

After undergoing the course students will be able to

1. Perform image manipulations and different digital image processing techniques
2. Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image.
3. Analyze pseudo and fullcolor image processing techniques.
4. Apply various morphological operators on images
OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

UNIT – I

UNIT – II
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI
Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery
OUTCOMES:

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- Design applications using internet protocols
- Understand routing and congestion control algorithms
- Understand how internet works

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES

The student will be introduced to the functionality of each of the components that comprise a fiber-optic communication system

- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
- the principles of single and multi-mode optical fibers and their characteristics
- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.
- Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
- Analyze and design optical communication and fiber optic sensor systems.
- the models of analog and digital receivers.

UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II


UNIT III

- Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT IV

Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.
UNIT VI
Optical system design - Point-to-point links - Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:


REFERENCES:


OUTCOMES

After going through this course the student will be able to

- Choose necessary components required in modern optical communications systems.
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses
  - Design, build, and demonstrate optical fiber experiments in the laboratory.
UNIT I

INTRODUCTION: TV transmitter and receivers, synchronization. Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal: Horizontal and vertical sync, scanning sequence, Colour signal generation and Encoding: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.

UNIT II

TV SIGNAL TRANSMISSION AND PROPAGATION: Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels.

MONOCHROME TV RECEIVER: RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits.

PAL–D colour receiver: Electron tuners, IF subsystem, Y-signal channel, chroma decoder, separation of U & V Colour phasors, synchronous demodulators, subcarrier generation, raster circuits.

UNIT III

VISION IF SUBSYSTEM: AGC, noise cancellation, video and intercarrier sound signal detection, Colour receiver IF subsystem, Receiver sound system: FM detection, FM Sound detectors, typical applications.TV Receiver Tuners: Tuner operation, VHF and UHF tuners.

COLOUR SIGNAL DECODING:PAL-D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, Reference oscillator, Indent and color killer circuits, RO phase shift and 180 degrees PAL-SWITCH circuitry, U & V demodulators, Colour signal mixing.

UNIT-IV

HISTORY OF HDTV: Analog and Digital TV Compared, Going HD, Broadcast Engineering and Information Technology, The Road to HDTV, The Grand Alliance, A DTV Standard at Last, Producing HDTV, HD Goes Coast-to-Coast, DTV Conversion.

COMPRESSION TECHNIQUES: Compression, MPEG-2 Video Compression, MPEG-4, H.264, Motion – JPEG (M-JPEG) compression, Audio Compression, Compressed Data Streams, Packetized Transport.

UNIT V

DTV TRANSMITTER AND RECIEVER: Engineering Basics, Presentation, Transmission, Reception and Demodulation, Transport Stream Demultiplexing, Decoding and Decompression, Program Assembly and Presentation, Receiver Issues, Presentation Concerns.


UNIT VI

TEXT BOOKS


2. Television and Video Engineering – A.M. Dhake, 2nd Edition,


REFERENCES


OBJECTIVES:
The student will

• Understand the means of measuring traffic.
• Understand the implication of the traffic level on system design.

UNIT -I:
Introduction: Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System,
Manual Switching System, Major Telecommunication Networks.
Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar
Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:
Electronic Space Division Switching: Stored Program Control, Centralized SPC: Stand by mode, Synchronous
duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage
Networks, Three-Stage Networks, n-Stage Networks.

UNIT -III
Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching,
Generalised time division Space switch, Basic Time division time switching: modes of operation, simple problems,
Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time
Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching, Three-Stage
Combination Switching, n-Stage Combination Switching.

UNIT IV
Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan,
Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common
Channel Signaling, CCITT Signaling System no.6, CCITT Signaling System no.7, Packet Switching: Statistical
Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

UNIT -V:
Switching Networks: Single- Stage Networks, Grading, Link Systems, Grades of service of link systems,
Application of Graph Theory to link Systems, Use of Expansion, Call Packing,
Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks
Telecommunications Traffic: The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model,
Lost-call Systems, Queuing Systems. Problems

UNIT -VI:
Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture,
Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization,

TEXT BOOKS:
1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
REFERENCES:
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.

Outcomes

The student will be able to

- Evaluate the time and space parameters of a switched signal
- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.
UNIT-I
INTRODUCTION TO VERILOG:
Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, system tasks, programming language interface (PLI), module, simulation and synthesis tools, test benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS:
Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT-II
GATE LEVEL MODELLING:
Introduction, AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.

UNIT-III
BEHAVIORAL MODELLING:
Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, simulation flow, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV
DATAFLOW LEVEL AND SWITCH LEVEL MODELLING:
Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets.

UNIT-V
SYNTHESIS OF COMBINATIONAL AND SEQUENTIAL LOGIC USING VERILOG:
Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, Exploiting logic don’t care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

UNIT-VI
VERILOG MODELS:
Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design and Design of Microcontroller CPU.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

The main objectives of this course are given below:

• The basic concepts of an embedded system are introduced.
• The various elements of embedded hardware and their design principles are explained.
• Different steps involved in the design and development of firmware for embedded systems is elaborated.
• Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
• Fundamental issues in hardware software co-design were presented and explained.
• Familiarise with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
• Embedded system implementation and testing tools are introduced and discussed.

Outcomes:

At the end of this course the student can able to:

• Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
• The hardware components required for an embedded system and the design approach of an embedded hardware.
• The various embedded firmware design approaches on embedded environment.
• Understand how to integrate hardware and firmware of an embedded system using real time operating system.

Syllabus

UNIT-I
INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-II
EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.
UNIT-III
EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV
REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation, Device Drivers.
HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

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

UNIT-VI
EMBEDDED SYSTEM IMPLEMENTATION AND TESTING: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:


References:


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ANALOG IC DESIGN
ELECTIVE - II

OBJECTIVES

The student will be introduced to

• The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
• In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
• Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.
• The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

UNIT -I:

UNIT -II:
Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

UNIT -IV:

UNIT -V:
Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.
UNIT -VI:
Oscillators & Phase-Locked Loops: General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.
Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

Text Books:


References:


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

• Understand the concepts of MOS Devices and Modeling.
• Design and analyze any Analog Circuits in real time applications.
• Extend the Analog Circuit Design to Different Applications in Real Time.
• Understand of Open-Loop Comparators and Different Types of Oscillators.
NETWORK SECURITY AND CRYPTOGRAPHY  
ELECTIVE - II

OBJECTIVES:
• In this course the following principles and practice of cryptography and network security are covered:
• Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
• Public-key cryptography (RSA, discrete logarithms),
• Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
• Email and web security, viruses, firewalls, digital right management, and other topics.

UNIT- I:  
Basic Principles

UNIT- II:  
Symmetric Encryption

UNIT- III:  
Asymmetric Encryption
Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

UNIT- IV:  
Data Integrity, Digital Signature Schemes & Key Management
Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT -V:  
Network Security-I
Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

UNIT -VI:  
Network Security-II
Security at the Network Layer: IPSec, System Security

OUTCOMES:
• To be familiarity with information security awareness and a clear understanding of its importance.
• To master fundamentals of secret and public cryptography
• To master protocols for security services
• To be familiar with network security threats and countermeasures
• To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)

TEXT BOOKS:

REFERENCE BOOKS:
Minimum Twelve Experiments to be conducted:
Part – A (Any 7 Experiments (8 & 9 compulsory)):
1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
7. Scattering parameters of Magic Tee.
9. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):
10. Characterization of LED.
12. Intensity modulation of Laser output through an optical fiber.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:
1. Regulated Klystron Power Supply, Klystron mount
2. VSWR Meter
3. Micro Ammeter
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Crystal Diode detector
8. Micro wave components (Attenuation)
9. Frequency Meter
10. Slotted line carriage
11. Probe detector
12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software
21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)
List of the Experiments / programs

To Student has to perform at least FOUR Experiments in each part

PART-1 (SIGNALS)

1) Generation of discrete time signals for discrete signals
2) To verify the Linear Convolution
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
3) To verify the Circular Convolution for discrete signals
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
4) To Find the addition of Sinusoidal Signals
5) To verify Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT)
   a) Using MATLAB
   b) Using Code Composer Studio (CCS)
6) Transfer Function Stability Analysis: using pole-zero plot, bode plot, Nyquist plot, z-plane plot.

PART-2 (FILTERS)

7) Frequency Response of IIR low pass Butterworth Filter
8) Frequency Response of IIR high pass Butterworth Filter
9) Frequency Response of IIR low pass Chebyshev Filter
10) Frequency Response of IIR high pass Chebyshev Filter
11) Frequency Response of FIR low pass Filter using Rectangle Window
12) Frequency Response of FIR low pass Filter using Triangle Window

PART-3 (IMAGE PROCESSING)

13) An image processing in a false contouring system
14) To generate the histogram equalization to the image
15) To verify the Normalized Cross Correlation to the addition of noise and removal of noise using filters to an image.
16) Compute the edge of an image using spatial filters.
17) Perform the image motion blur and calculate PSNR to the noise image and also noise free image.
18) To verify the PSNR to the Second order Decomposition of Discrete Wavelet transforms and to the reconstructed image using inverse Discrete Wavelet transform.
OBJECTIVES

The student will be introduced to:

1. Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
2. Understand the different types of interference s influencing cellular and mobile communications.
3. Understand the frequency management, channel assignment and various propagation effects in cellular environment.
4. Understand the different types antennas used at cell site and mobile.
5. Understand the concepts of handoff and types of handoffs.
6. Understand the architectures of GSM and 3G cellular systems.

UNIT I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT II

INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT III

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells.

CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT IV

CELL SITE AND MOBILE ANTENNAS : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.
UNIT V
HANDOFF STRATEGIES
Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI
DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, OFDMA; architecture of 3G cellular systems.

TEXTBOOKS :

REFERENCES :

Outcomes:
At the end of this course the student can able to:
1. Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
2. Understand the frequency management, channel assignment strategies and antennas in cellular systems.
3. Understand the concepts of handoff and architectures of various cellular systems.
UNIT I

UNIT II

UNIT III
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

UNIT V
Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI
Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS:

REFERENCES:
OUTCOMES
The student will be able to

• Select the instrument to be used based on the requirements.
• Understand and analyze different signal generators and analyzers.
• Understand the design of oscilloscopes for different applications.
• Design different transducers for measurement of different parameters.
OBJECTIVES
The student will be introduced to:

1. Understand the basic concepts, applications, frequencies used and types of satellite communications.
2. Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite communications.
3. Understand the various satellite subsystems and its functionality.
4. Understand the concepts of satellite link design and calculation of C/N ratio.
5. Understand the concepts of multiple access and various types of multiple access techniques in satellite systems.
6. Understand the concepts of satellite navigation, architecture and applications of GPS.

UNIT I


UNIT II

UNIT III
SATELLITE LINK DESIGN[1] : Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT IV
MULTIPLE ACCESS[1][2] : Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT V

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS[1] : Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs
UNIT VI

TEXT BOOKS:

REFERENCES :

Outcomes:
At the end of this course the student can able to:

1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
3. Understand the various types of multiple access techniques and architecture of earth station design.
4. Understand the concepts of GPS and its architecture.
UNIT I
OVERVIEW OF WIRELESS SENSOR NETWORKS:
ARCHITECTURES:

UNIT II
NETWORKING Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III
MAC Protocols for Wireless Sensor Networks:

UNIT-IV
ROUTING PROTOCOLS:

UNIT-V
TRANSPORT LAYER AND SECURITY PROTOCOLS:

UNIT- VI
SECURITY IN WSNs:
SENSOR NETWORK PLATFORMS AND TOOLS:
APPLICATIONS of WSN:
S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications
TEXT BOOKS:

REFERENCES:

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OBJECTIVES

- The student will be able to understand the MOS Design.
- In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
- Another main object of this course is to motivate the graduate students to design and to develop the Digital Integrated Circuits for different Applications.
- The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIT-I:
MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:
Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:
Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

UNIT-V:

UNIT-VI:
Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.
Text Books:


References:


OUTCOMES

After going through this course the student will be able to

- Understand the concepts of MOS Design.
- Design and analysis of Combinational and Sequential MOS Circuits.
- Extend the Digital IC Design to Different Applications.
- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
OPERATING SYSTEMS
ELECTIVE-III

OBJECTIVES:
• Study the basic concepts and functions of operating systems.
• Understand the structure and functions of OS.
• Learn about Processes, Threads and Scheduling algorithms.
• Understand the principles of concurrency and Deadlocks.
• Learn various memory management schemes.
• Study I/O management and File systems.
• Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I
Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II:

UNIT-III:
Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation
Virtual Memory Management:
Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:
Concurrency: ProcessSynchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples
Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-V:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
File System implementation- File system structure, allocation methods, free-space management
Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI:
Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.
OUTCOMES:

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

TEXT BOOK:


REFERENCES:

COURSE STRUCTURE AND SYLLABUS

For

ELECTRICAL AND ELECTRONICS ENGINEERING
(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
### I Year – I Semester

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SYLLABUS

I Year - I Semester

ENGLISH - 1

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.
READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports— are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
Assignments= 5%
End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK:

ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

NON-DETAILED TEXTBOOK:

PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.
   **OBJECTIVE:**
   To develop human resources to serve the society in different ways.
   **OUTCOME:**
   The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading
   **OBJECTIVE:**
   To develop extensive reading skill and comprehension for pleasure and profit.
   **OUTCOME:**
   Acquisition of writing skills

UNIT 2:

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.
   **OBJECTIVE:**
   To highlight road safety measures whatever be the mode of transport.
   **OUTCOME:**
   The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama: A Course on Reading'
   **OBJECTIVE:**
   To develop extensive reading skill and comprehension for pleasure and profit.
   **OUTCOME:**
   Acquisition of writing skills
UNIT 3:
1. 'Evaluating Technology' from English for Engineers and Technologists.
   **OBJECTIVE:**
   To highlight the advantages and disadvantages of technology.
   **OUTCOME:**
   The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.
2. 'The Verger' from 'Panorama : A Course on Reading'
   **OBJECTIVE:**
   To develop extensive reading skill and comprehension for pleasure and profit.
   **OUTCOME:**
   Acquisition of writing skills

UNIT 4:
1. 'Alternative Sources of Energy' from English for Engineers and Technologists.
   **OBJECTIVE:**
   To bring into focus different sources of energy as alternatives to the depleting sources.
   **OUTCOME:**
   The lesson helps to choose a source of energy suitable for rural India.
2. 'The Scarecrow' from Panorama : A Course on Reading
   **OBJECTIVE:**
   To develop extensive reading skill and comprehension for pleasure and profit.
   **OUTCOME:**
   Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.
   **OBJECTIVE:**
   To highlight the fact that animals must be preserved because animal life is precious.
   **OUTCOME:**
   The lesson creates an awareness in the reader as to the usefulness of animals for the human society.
2. 'A Village Host to Nation' from Panorama : A Course on Reading
   **OBJECTIVE:**
   To develop extensive reading skill and comprehension for pleasure and profit.
   **OUTCOME:**
   Acquisition of writing skills
UNIT 6:

1. 'Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

OUTCOME:
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.

MODEL QUESTION PAPER FOR THEORY

PART-I
Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II
Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A, B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:

1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT III: 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 (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:
Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule- Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).

UNIT V: First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.
UNIT VI: Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{axby}, \sin(ax+by), \cos(ax+by), x^m y^n$. Classification of second order partial differential equations.

Text Books:

Reference Books:
3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

**Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

**UNIT I: HIGH POLYMERS AND PLASTICS**

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates 

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.


**UNIT II: FUEL TECHNOLOGY**


**Explosives:**- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.
UNIT III: ELECTROCHEMICAL CELLS AND CORROSION
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion:- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS


Liquid crystals:- Introduction – Types – Applications

Superconductors :- Type-I & Type-2, properties & applications

Green synthesis:- Principles - 3 or 4 methods of synthesis with examples – R₄M₄ principles

UNIT V: SOLID STATE CHEMISTRY
Types of solids - close packing of atoms and ions - BCC , FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental semiconducting Materials:- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor.

Insulators (electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES
Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

Non-conventional energy sources:

(i) Hydropower include setup a hydropower plant (schematic diagram)
(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
(v) Biomass and biofuels

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

Standard Books:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.

Reference Books:
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.
Friction: Introduction, limiting friction and impending motion, coulomb’s laws of dry friction, coefficient of friction, cone of friction

UNIT II

Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

UNIT – III

Objectives : The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles ) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV

Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.
UNIT – V

Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion


TEXT BOOKS :


REFERENCES :

Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.
UNIT-IV
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:
Arrays & Strings
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays-Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:
Pointers, Structures, Files
Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.
Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.
Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, ReemaThareja, OXFORD.
Course Learning Objectives:
The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:
The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
Syllabus:

UNIT – I


Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
UNIT – III Biodiversity and its conservation:


UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V


UNIT – VI


The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.
**TEXT BOOKS:**
1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

**REFERENCE:**
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na$_2$CO$_3$ solution.

3. Determination of alkalinity of a sample containing Na$_2$CO$_3$ and NaOH.

4. Determination of KMnO$_4$ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K$_2$Cr$_2$O$_7$ solution.

6. Determination of Copper using standard K$_2$Cr$_2$O$_7$ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.
**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

**Reference Books**
ENGLISH - COMMUNICATION SKILLS LAB- I

PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:
To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.
The course content along with the study material is divided into six units.

UNIT 1:
1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
   Practice work.

UNIT 2:
1. Responding to Requests and asking for Directions
   Practice work.

UNIT 3:
1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:
1. Letters and Sounds
   Practice work.

UNIT 5:
1. The Sounds of English
   Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation

Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
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</table>

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording).
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVES:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

- Acquire knowledge about the basic concept of writing a program.

- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

- Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
Exercise - 13 Files
a) Write a C programming code to open a file and to print its contents on screen.
b) Write a C program to copy files

Exercise - 14 Files Continued
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

OUTCOMES:

• Apply and practice logical ability to solve the problems.

• Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

• Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs

• Understand and apply the in-built functions and customized functions for solving the problems.

• Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

• Document and present the algorithms, flowcharts and programs in form of user-manuals

• Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.
Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.
READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write techincal reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
(80% for the best of two and 20% for the other)
Assignments= 5%
End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cengage learning

The course content along with the study material is divided into six units.

UNIT 1:
1. 'The Greatest Resource- Education' from English Encounters

OBJECTIVE:
Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

OUTCOME:
The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

OUTCOME:
Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:
1. 'A Dilemma' from English Encounters

OBJECTIVE: The lesson centres on the pros and cons of the development of science and technology.

OUTCOME: The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.
OUTCOME: The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:
1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.
   OBJECTIVE: The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.
   OUTCOME: The lesson imparts the students to manage different cultural shocks due to globalization.
2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.
   OBJECTIVE: The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.
   OUTCOME: The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.
   OBJECTIVE: The lesson highlights insightful commentary on cultural traditions.
   OUTCOME: The theme projects society's need to re-examine its traditions when they are outdated.
2. 'Jagadish Chandra Bose' from The Great Indian Scientists.
   OBJECTIVE: The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.
   OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

UNIT 5:
1. 'The Health Threats of Climate Change' from English Encounters.
   OBJECTIVE: The essay presents several health disorders that spring out due to environmental changes
   OUTCOME: The lesson offers several inputs to protect environment for the sustainability of the future generations.
2. 'Prafulla Chandra Ray' from The Great Indian Scientists.
   OBJECTIVE: The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.
   OUTCOME: Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.
UNIT 6:
1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:
The lesson supports the developments of technology for the betterment of human life.

OUTCOME:
Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:
The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

MODEL QUESTION PAPER FOR THEORY

PART-I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A, B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

UNIT IV: Fourier Series:
Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet’s conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V: Applications of PDE:
Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

UNIT VI: Fourier Transforms:
Text Books:


Reference Books:

1. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:
1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

UNIT II: Eigen values - Eigen vectors and Quadratic forms:
Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:
Curve tracing: Cartesian, Polar and Parametric forms.
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.

UNIT IV: Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Applications: Evaluation of integrals.

UNIT V: Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:
ine integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.
Applications: Work done, Force.
Text Books:

Reference Books:
OBJECTIVES:

Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

UNIT-I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II

DIFFRACTION: Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III

POLARIZATION: Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).


UNIT-IV

ELECTROMAGNETIC FIELDS: Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V


UNIT-VI


**SEMICONDUCTOR PHYSICS:** Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein’s equation- Hall effect in semiconductors

**Outcome:** Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

**List of Text Books:**

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

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

UNIT-I
Introduction to Electrical Circuits
Passive components and their V-I relations. Sources (dependent and independent) -Kirchoff’s laws, Network reduction techniques(series, parallel, series - parallel, star-to-delta and delta-to-star transformation). source transformation technique, nodal analysis and mesh analysis.

UNIT-II
Network topology
Definitions of Graph and Tree, Basiccutset and tieset matrices for planar networks, Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality and Dual networks.

UNIT-III
Magnetic Circuit

UNIT-IV
Single Phase A.C Systems
Periodic waveforms (determination of rms, average value and form factor). Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks. Complex and polar forms of representations, steady state analysis of R, L and C circuits. Power Factor and its significance real, reactive power and apparent power, waveform of instantaneous power triangle and complex power.
UNIT-V
Analysis of AC Networks
Extension of node and mesh analysis to AC networks, Numerical problems on sinusoidal steady state analysis, Series and parallel resonance, Selectively band width and Quasi factor, Introduction to locus diagram.

UNIT-VI
Network theorems (DC & AC Excitations)
Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman’s theorem and compensation theorem.

Learning Outcomes:
Students are able to solve
- Various electrical networks in presence of active and passive elements.
- Electrical networks with network topology concepts.
- Any magnetic circuit with various dot conventions.
- Any R, L, C network with sinusoidal excitation.
- Any R, L, network with variation of any one of the parameters i.e R, L, C. and f.
- Electrical networks by using principles of network theorems.

Text Books:
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd

Reference Books:
2. Linear Circuit Analysis by De Carlo, Lin, Oxford publications
4. Electric Circuits by David A. Bell, Oxford publications
5. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications
Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

UNIT I  Polgons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

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

UNIT IV Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
TEXT BOOKS:
1. Engineering Drawing, N. D. Butt, Chariot Publications

REFERENCE BOOKS:
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

UNIT 1:

1. Debating
   Practice work

UNIT 2:

1. Group Discussions
   Practice work

UNIT 3:

1. Presentation Skills
   Practice work

UNIT 4:

1. Interview Skills
   Practice work

UNIT 5:

1. Email,
2. Curriculum Vitae
   Practice work

UNIT 6:

1. Idiomatic Expressions
2. Common Errors in English
   Practice work
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a technical/mini-project/experimental report with scientific temper.
ENGINEERING WORKSHOP:

Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel
IT WORKSHOP:

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

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

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

Productivity tools Crafting professional word documents; excel spreadsheets, power point presentations and personal web sites using the Microsoft suite of office tools
(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware

Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

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

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

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

Task 5:
Hardware Troubleshooting (Demonstration):
Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).
Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Internet & Networking Infrastructure

Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

Word

Task 9: MS Word Orientation:
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.


Excel

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations
Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, autofill, Formatting Text
LOOKUP/VLOOKUP

Task 12: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.
TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references

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

REFERENCE:

Essential Computer and IT Fundamentals for Engineering and Science Students, N. B. Venkateswarlu
Preamble:
This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

Learning Objectives:
- To study the concepts of balanced and unbalanced three-phase circuits.
- To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
- To study the performance of a network based on input and output excitation/response.
- To understand the realization of electrical network function into electrical equivalent passive elements.
- To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

UNIT-I Balanced Three phase circuits
Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power.

UNIT-II Unbalanced Three phase circuits
Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

UNIT-III Transient Analysis in DC and AC circuits
Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

UNIT-IV Two Port Networks
Two port network parameters – Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks - Poles and zeros of network functions.

UNIT-V Network synthesis
Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

UNIT-VI Fourier analysis and Transforms
Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.
Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits.
Learning Outcomes:

- Students are able to solve three-phase circuits under balanced and unbalanced condition.
- Students are able to find the transient response of electrical networks for different types of excitations.
- Students are able to find parameters for different types of network.
- Students are able to realize electrical equivalent network for a given network transfer function.
- Students are able to extract different harmonics components from the response of an electrical network.

Text Books:
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd

Reference Books:
2. Introduction to circuit analysis and design by Tildon Glisson, Jr, Springer Publications.
3. Circuits by A. Bruce Carlson, Cengage Learning Publications
5. Networks and Systems by D. Roy Choudhury, New Age International publishers
6. Electric Circuits by David A. Bell, Oxford publications
Preamble:
This is a basic course on rotating electrical machines. This course covers the topics related to principles, performance, applications and design considerations of dc machines and transformers.

Learning objectives:
- Understand the unifying principles of electromagnetic energy conversion.
- Understand the construction, principle of operation and performance of DC machines.
- Learn the characteristics, performance, methods of speed control and testing methods of DC motors.
- To predetermine the performance of single phase transformers with equivalent circuit models.
- Understand the methods of testing of single-phase transformer.
- Analyze the three phase transformers and achieve three phase to two phase conversion.

UNIT–I:
Electromechanical Energy Conversion and introduction to DC machines
Principles of electromechanical energy conversion – singly excited and multi excited system – Calculation of force and torque using the concept of co-energy.
Construction and principle of operation of DC machine – EMF equation for generator – Classification of DC machines based on excitation – OCC of DC shunt generator.

UNIT–II:
Performance of D.C. Machines
Torque and back-emf equations of dc motors– Armature reaction and commutation – characteristics of separately-excited, shunt, series and compound motors - losses and efficiency- applications of dc motors.

UNIT–III:
Starting, Speed Control and Testing of D.C. Machines
Necessity of starter – Starting by 3 point and 4 point starters – Speed control by armature voltage and field control – testing of DC machines - brake test, Swinburne’s method – principle of regenerative or Hopkinson’s method - retardation test -- separation of losses.

UNIT–IV:
Single-phase Transformers
Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.
UNIT-V
Single-phase Transformers Testing

UNIT-VI
3-Phase Transformers
Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

Learning outcomes:
• Able to assimilate the concepts of electromechanical energy conversion.
• Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines.
• Able to understand the performance of single phase transformers.
• Able to analyze the performance of single phase transformers.
• Able to predetermine regulation, losses and efficiency of single phase transformers.
• Able to parallel transformers, control voltages with tap changing methods and achieve three-phase to two-phase transformation.

Text Books:
1. Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charleskingsley,StephenD.Umans, TMH

Reference Books:
Preamble:
This course introduces the concepts of semi-conductor physics and operation of various semi-conductor devices. Realization of rectifiers, amplifiers and oscillators using semi-conductor devices and their analysis is also introduced in this course.

Unit-I:
Objective:
To learn the basics of semiconductor physics.


Outcome:
Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.

Unit-II:
Objective:
To study the construction details, operation and characteristics of various semiconductor diodes.

Junction Diode Characteristics
Operation and characteristics of p-n junction diode. Current components in p-n diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic), energy band diagram of p-n diode.
Special Diodes: Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode

Outcome:
Students are able to explain the operation and characteristics of PN junction diode and special diodes.

Unit-III:
Objective:
To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.

Rectifiers and Regulators
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, and comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators, over load voltage protection.
Outcome:
Ability to understand operation and design aspects of rectifiers and regulators.

Unit-IV:
Objective:
To study the characteristics of different bipolar junction transistors and their biasing stabilization and compensation techniques. To analyze transistor amplifiers using h-parameters.

Transistors

Outcome:
Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.

Unit- V:
Objective:
To understand the basics of FET, Thyristors, Power IGBTs and Power MOSFETs.

Power semiconductor devices
Principle of operation and characteristics of Thyristors, Silicon control rectifiers, power IGBT and power MOSFET their ratings. Comparison of power devices.
FET: JFET Characteristics (Qualitative explanation), MOFET Characteristics–static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

Outcome:
Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.

Unit VI:
Objective:
To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

Amplifiers and oscillators
Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers.
Power Amplifiers – Classification, push-pull amplifiers, Introduction to harmonics (distortion factor.

Outcome:
Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.
TEXT BOOKS:

REFERENCE BOOKS:
1. Electronic Devices and Circuits by David A. Bell, Oxford University Press
Electromagnetic fields are the pre-requisite for most of the subjects in the gamut of electrical engineering. The study of this subject enables students to understand and interpret the phenomenon pertinent to electrical engineering using microscopic quantities such as electric and magnetic field intensities, scalar and vector potentials.

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

UNIT – I  Electrostatics:
Electrostatic Fields – Coulomb’s Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass’s law — Maxwell’s first law, div( D )=ρv Laplace’s and Poison’s equations and Solution of Laplace’s equation in one variable.

UNIT – II  Conductors – Dielectrics and Capacitance:
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 Polarization – Boundary conditions between conduction to Dielectric and dielectric to dielectrics capacitance – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm’s law in point form – Equation of continuity

UNIT – III  Magneto statics and Ampere’s Law:
Static magnetic fields – Biot-Savart’s law – Oesterd’s experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell’s second Equation, div(B)=0 –Ampere’s circuital law and its applications viz. MFI due to an infinite sheet of current and a long filament carrying conductor – Point form of Ampere’s circuital law –Field due to a circular loop, rectangular and square loops, Maxwell’s third equation, Curl (H)=J.
UNIT – IV  Force in Magnetic fields:
Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a
current element in a magnetic field – Force on a straight and a long current carrying
conductor in a magnetic field – Force between two straight long and parallel current carrying
conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic
dipole – Torque on a current loop placed in a magnetic field.

UNIT – V  Self and Mutual inductance:
Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and
mutual inductance between a straight long wire and a square loop wire in the same plane –
ergy stored and density in a magnetic field.

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

Learning outcomes:
- To Determine electric fields and potentials using Gauss’s law solving Laplace’s or
  Poisson’s equations, for various electric charge distributions.
- To Calculate and design capacitance, energy stored in dielectrics.
- To Calculate the magnetic field intensity due to current, the application of Ampere’s
  law and the Maxwell’s second and third equations.
- To determine the magnetic forces and torque produced by currents in magnetic field
- To determine self and mutual inductances and the energy stored in the magnetic field.
- To calculate induced e.m.f., understand the concepts of displacement current and
  Poynting vector.

Text Books:

Reference Books:
2. “Introduction to Electro Dynamics” by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd
   edition
4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher
   Education.
II Year – I SEMESTER

L T P C
4 0 0 3

THERMAL AND HYDRO PRIME MOVERS

Part-A: Thermal prime movers

Course Objectives: To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.

UNIT I:
Objectives: To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.


UNIT II:
Objectives: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.


UNIT III:
Objectives: To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.

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

Part-B: Hydro prime movers

UNIT IV:
Objectives: To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.
IMPACT OF JETS AND PUMPS: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves

UNIT V:
Objectives: To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

HYDRAULIC TURBINES: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

UNIT VI:
Objectives: To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

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

Text Books:
1. Thermal Engineering by Rajput, Lakshmi publications

Reference Books:
4. “Fluid Mechanics & Fluid power Engineering, Dr D.S.Kumar
5. “Water Power Engineering” M.M Desumukh
II Year - I Semester

4 0 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to all Branches)

Course Objectives:
- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Unit-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics – Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand – Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit – II:
Production and Cost Analyses:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions- Isoquants and Isocosts and choice of least cost factor combination- Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost – Volume-Profit analysis- Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.

Unit – III:
Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.
Unit – IV:  
**Types of Business Organization and Business Cycles:**  

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

Unit – VI:  
**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**Course Outcome:**  
*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.  
*One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.  
*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

**TEXT BOOKS**

**REFERENCES:**
2. V. Maheswari: Managerial Economics, Sultan Chand.2014  
Course Objective: To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

NOTE: TO CONDUCT A MINIMUM OF 12 EXPERIMENTS BY CONDUCTING A MINIMUM OF SIX FROM EACH SECTION.

SECTION A - THERMAL ENGINEERING LAB
1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test on 4-stroke Diesel engine.
3. I.C. Engines performance test on 2-stroke petrol engine.
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine
5. Determination of FHP by retardation and motoring test on IC engine
7. Economical speed test of an IC engine
8. Study of boilers

SECTION B – HYDRAULIC MACHINES LAB
1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.
7. Calibration of Venturimeter.
9. Determination of loss of head due to sudden contraction in a pipeline.
Learning objectives:

To verify and demonstrate various thermos, locus diagrams, resonance and two port networks. To determine self and mutual inductance of a magnetic circuit, parameters of a given coil and measurement of 3-phase power.

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin’s and Norton’s Theorems
2) Verification of Superposition theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity, Millmann’s Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Parameters of a choke coil.
11) Determination of cold and hot resistance of an electric lamp.
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

Learning outcomes:

Able to apply various thermos, determination of self and mutual inductances, two port parameters of a given electric circuits. Able to draw locus diagrams. Waveforms and phasor diagram for lagging and leading networks.
Preamble:
This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

Learning Objectives:
- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy.
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns.

UNIT –I:
Measuring Instruments

UNIT –II:
Measurement of Power and Energy

UNIT – III:
Potentiometers
UNIT – IV:
Measurements of Parameters

UNIT – V:
Magnetic Measurements

UNIT – VI:
Digital Meters

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

Text Books:

Reference Books:
2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
4. Electrical Measurements by Forest K. Harris. John Wiley and Sons
Preamble:
This course covers the topics on 3-phase induction motor, 1-phase induction motor and synchronous machines which have wide application in power systems. The main aim of the course is to provide a detailed analysis of operation and performance of 3-phase induction motor, 1-phase induction motor and synchronous machines. In addition, it also covers voltage regulation and parallel operation of synchronous generators.

Learning objectives:
• Understand the principle of operation and performance of 3-phase induction motor.
• Quantify the performance of induction motor and induction generator in terms of torque and slip.
• To understand the torque producing mechanism of a single phase induction motor.
• To understand the principle of emf generation, the effect of armature reaction and predetermination of voltage regulation in synchronous generators.
• To study parallel operation and control of real and reactive powers for synchronous generators.
• To understand the operation, performance and starting methods of synchronous motors.

UNIT-I
3-phase Induction Motors
Construction details of cage and wound rotor machines - production of rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their interrelationship – equivalent circuit – phasor diagram

UNIT-II
Characteristics, starting and testing methods of Induction Motors
Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging – speed control of induction motor with V/f method – no load and blocked rotor tests - circle diagram for predetermination of performance– methods of starting – starting current and torque calculations – induction generator operation (Qualitative treatment only)

UNIT – III:
Single Phase Motors

UNIT–IV:
Construction, Operation and Voltage Regulation of Synchronous generator
UNIT –V:
Parallel operation of synchronous generators
Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing – Control of real and reactive power– Numerical problems.

UNIT–VI:
Synchronous motor – operation, starting and performance
Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque– Variation of current and power factor with excitation –Synchronous condenser – Mathematical analysis for power developed– Hunting and its suppression – Methods of starting – Applications.

Learning outcomes:
- Able to explain the operation and performance of three phase induction motor.
- Able to analyze the torque-speed relation, performance of induction motor and induction generator.
- Able to explain design procedure for transformers and three phase induction motors.
- Implement the starting of single phase induction motors.
- To perform winding design and predetermine the regulation of synchronous generators.
- Avoid hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor.

Text Books:
1. Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charleskingsley,StephenD.Umans, TMH

Reference Books:
UNIT – I
REVIEW OF NUMBER SYSTEMS & CODES:
i) Representation of numbers of different radix, conversion from one radix to another
radix, r-1’s compliments and r’s compliments of signed members, problem solving.
ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc.,
iii) Logic operations and error detection & correction codes; Basic logic operations -
NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard
SOP and POS, Forms, Gray code, error detection, error correction codes (parity
checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR
realizations.

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

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

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

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

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

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

REFERENCE BOOKS:
1. Modern Digital Electronics by RP Jain, TMH
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
Preamble:

This course introduces the elements of linear control systems and their analysis. Classical methods of design using frequency response. The state space approach for design, modeling and analysis of simple PD, PID controllers.

Learning Objectives:

- To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.
- To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.
- To investigate the stability of closed loop systems using Routh’s stability criterion and the analysis by root locus method.
- To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
- To discuss basic aspects of design and compensation of linear control systems using Bode plots.
- Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

UNIT – I:
Mathematical Modeling Of Control Systems
Classification of control systems, Open Loop and closed loop control systems and their differences. Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula.

UNIT-II:
Time Response Analysis
Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – III:
Stability and Rootlocus Technique
The concept of stability – Routh’s stability criterion –limitations of Routh’s stability –Root locus concept - construction of root loci (Simple problems)

UNIT–IV:
Frequency Response Analysis
Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.
UNIT–V:  
**Classical Control Design Techniques**  
Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

UNIT–VI:  
**State Space Analysis Of Lti Systems**  
Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it’s Properties – Concepts of Controllability and Observability.

**Learning Outcome:**
- Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
- Capability to determine time response specifications of second order systems and to determine error constants.
- Acquires the skill to analyze absolute and relative stability of LTI systems using Routh’s stability criterion and the root locus method.
- Capable to analyze the stability of LTI systems using frequency response methods.
- Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
- Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.

**Text Books:**

**Reference Books:**
1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
Preamble:
Electrical Power plays significant role in day to day life of entire mankind. The aim of this course is to allow the students to understand the concepts of the generation and distribution of power along with economic aspects.

Learning objectives:
- To study the principle of operation of different components of a thermal power stations.
- To study the principle of operation of different components of a Nuclear power stations.
- To study the concepts of DC/AC distribution systems and voltage drop calculations.
- To study the constructional and operation of different components of an Air and Gas Insulated substations.
- To study the constructional details of different types of cables.
- To study different types of load curves and tariffs applicable to consumers.

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

UNIT-II Nuclear Power Stations
Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.

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 both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution, comparison of DC and AC distribution.

UNIT-IV Substations
Classification of substations:
Air Insulated Substations - Indoor & Outdoor substations, Substations layouts of 33/11 kV showing the location of all the substation equipment.
Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.
Gas Insulated Substations (GIS) – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, constructional aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.
UNIT-V Underground Cables
Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable.
Capacitance of single and 3-Core belted Cables: Grading of Cables-Capacitance grading and Inter sheath grading.

UNIT-VI Economic Aspects of Power Generation & Tariff
**Economic Aspects** - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.
**Tariff Methods** - Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three-part, and power factor tariff methods.

**Learning Outcomes:**
- Students are able to identify the different components of thermal power plants.
- Students are able to identify the different components of nuclear Power plants.
- Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems.
- Students are able to identify the different components of air and gas insulated substations.
- Students are able to identify single core and multi core cables with different insulating materials.
- Students are able to analyze the different economic factors of power generation and tariffs.

**Text Books:**

**Reference Books:**
2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.
MANAGEMENT SCIENCE

Course Objectives:
*To familiarize with the process of management and to provide basic insight into select contemporary management practices
*To provide conceptual knowledge on functional management and strategic management.

Unit I

Unit II
Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit III

Unit IV
Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

Unit V

Unit VI
Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Benchmarking, Balanced Score Card.
Course Outcome:
*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
*Will familiarize with the concepts of functional management project management and strategic management.

References:

Text Books
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, ‘Management Science’ Cengage, Delhi, 2012.

References
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
7. Hitt and Vijaya Kumar: Strategic Management, Cengage learning
II Year – II SEMESTER

ELECTRICAL MACHINES – I LABORATORY

Learning objectives:

• To plot the magnetizing characteristics of DC shunt generator and understand the mechanism of self-excitation.
• To control the speed of the DC motors.
• Determine and predetermine the performance of DC machines.
• To predetermine the efficiency and regulation of transformers and assess their performance.

Any 10 of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
3. Hopkinson’s test on DC shunt machines. Predetermination of efficiency.
4. Swinburne’s test and Predetermination of efficiencies as Generator and Motor.
5. Speed control of DC shunt motor by Field and armature Control.
7. Separation of losses in DC shunts motor.
8. Oc& SC test on single phase transformer.
9. Sumpner’s test on single phase transformer.
10. Scott connection of transformers
11. Parallel operation of Single phase Transformers
12. Separation of core losses of a single phase transformer
13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers

Learning outcomes:

• To determine and predetermine the performance of DC machines and Transformers.
• To control the speed of DC motor.
• To achieve three phase to two phase transformation.
ELECTRONIC DEVICES AND CIRCUITS LAB

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Electronic Workshop Practice:

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

List of Experiments: (Minimum of Ten Experiments has to be performed)

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

Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
III Year – I SEMESTER

POWER SYSTEMS–II

4 0 0 3

Preamble:

This course is an extension of power systems–I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

Learning Objectives:

• To compute inductance/capacitance of transmission lines and to understand the concepts of GMD/GMR.
• To study the short and medium length transmission lines, their models and performance.
• To study the performance and modeling of long transmission lines.
• To study the effect of travelling waves on transmission lines.
• To study the factors affecting the performance of transmission lines and power factor improvement methods.
• To discuss sag and tension computation of transmission lines as well as to study the performance of overhead insulators.

UNIT–I:
Transmission Line Parameters

UNIT–II:
Performance of Short and Medium Length Transmission Lines

UNIT–III:
Performance of Long Transmission Lines

UNIT – IV:
Power System Transients

UNIT–V:
Various Factors governing the Performance of Transmission line

UNIT–VI:
Sag and Tension Calculations and Overhead Line Insulators

Learning Outcomes:
• Able to understand parameters of various types of transmission lines during different operating conditions.
• Able to understand the performance of short and medium transmission lines.
• Student will be able to understand travelling waves on transmission lines.
• Will be able to understand various factors related to charged transmission lines.
• Will be able to understand sag/tension of transmission lines and performance of line insulators.

Text Books:

Reference Books:
Preamble:

This course gives a flavor of renewable sources and systems to the students. It introduces solar energy, its radiation, collection, storage, and its applications. This covers generation, design, efficiency, and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells, and geothermal systems.

Learning Objectives:
- To study the solar radiation data, extraterrestrial radiation, radiation on earth’s surface.
- To study solar thermal collections.
- To study solar photovoltaic systems.
- To study maximum power point techniques in solar pv and wind energy.
- To study wind energy conversion systems, Betz coefficient, tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell, and geothermal systems.


UNIT–II: Solar Thermal Systems

UNIT–III: Solar Photovoltaic Systems

UNIT–IV: Wind Energy
UNIT–V:
Hydro and Tidal power systems

UNIT–VI:
Biomass, fuel cells and geothermal systems
Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation

Learning Outcomes:
Student should be able to
- Analyze solar radiation data, extraterrestrial radiation, and radiation on earth’s surface.
- Design solar thermal collectors, solar thermal plants.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind energy systems.
- Explain wind energy conversion systems, wind generators, power generation.
- Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Text Books:

Reference Books:
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
OBJECTIVES:

The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.


UNIT –III: SAMPLING THEOREM – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT –IV: ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s, Relation
between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.


TEXT BOOKS:


REFERENCE BOOKS:


OUTCOMES:

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

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.
Pulse and Digital Circuits

Objectives

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

Unit I

Linear Waveshaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

Unit II

Non-linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; 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 clampsers.

Unit III

Switching Characteristics of Devices: Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Breakdown voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.


Unit IV


Unit V

Voltage Time Base Generators:
General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.
UNIT VI
LOGIC FAMILIES & SAMPLING GATES:

TEXT BOOKS:
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005

REFERENCES:
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

OUTCOMES
After going through this course the student will be able to
• Design linear and non-linear wave shaping circuits.
• Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
• Design different multivibrators and time base generators.
• Utilize the non sinusoidal signals in many experimental research areas.
Preamble:

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:

- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters.
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To analyze the operation of AC-AC regulators.

UNIT–I: Power Semi-Conductor Devices

Thyristors–Silicon controlled rectifiers (SCR’s) – Characteristics of power MOSFET and power IGBT– Basic theory of operation of SCR– Static characteristics– Turn on and turn off methods– Dynamic characteristics of SCR– Snubber circuit design– Basic requirements of gating circuits for SCR, IGBT and MOSFET.

UNIT–II: AC-DC Single-Phase Converters

1-phase half wave controlled rectifiers – R load and RL load with and without freewheeling diode – 1-phase full wave controlled rectifiers – center tapped configuration and bridge configuration- R load and RL load with and without freewheeling diode – continuous and discontinuous conduction – Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction.

UNIT–III: AC-DC 3-Phase Converters

3-phase half wave and Full wave uncontrolled rectifier – 3-phase half wave controlled rectifier with R and RL load – 3-phase fully controlled rectifier with R and RL load – 3-phase semi controlled rectifier with R and RL load.

UNIT–IV: DC–DC Converters

Analysis of Buck, boost and buck-boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt-sec balance in CCM & DCM output voltage ripple & inductor current, ripple for CCM only – Principle operation of forward and fly back converters in CCM.
UNIT – V:
DC–AC Converters
1-phase halfbridge and full bridge inverters with R and RL loads – 3-phase square wave inverters – 120° conduction and 180° conduction modes of operation – PWM inverters – Quasi-square wave pulse width modulation – Sinusoidal pulse width modulation – Prevention of shoot through fault in Voltage Source Inverter (VSI) – Current Source Inverter (CSI) – Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI).

UNIT – VI:
AC – AC Regulators.
Static V-I characteristics of TRIAC and modes of operation – 1-phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load only – Transformer tap changing using antiparallel Thyristors.

Learning Outcomes:
Student should be able to
- Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR’s.
- Design firing circuits for SCR.
- Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters.
- Analyze the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyze the operation of AC-AC regulators.

Text Books:

Reference Books:
5. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
Learning objectives:
- To control the speed of three phase induction motors.
- To determine /predetermine the performance three phase and single phase induction motors.
- To improve the power factor of single phase induction motor.
- To predetermine the regulation of three–phase alternator by various methods, find $X_d/X_q$ ratio of alternator and asses the performance of three–phase synchronous motor.

The following experiments are required to be conducted as compulsory experiments:
1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
4. Regulation of three–phase alternator by Potier triangle method
5. V and Inverted V curves of a three—phase synchronous motor.
6. Determination of $X_d$ and $X_q$ of a salient pole synchronous machine
7. Equivalent circuit of single phase induction motor
8. Speed control of induction motor by V/f method.

Learning outcomes:
- Able to assess the performance of single phase and three phase induction motors.
- Able to control the speed of three phase induction motor.
- Able to predetermine the regulation of three–phase alternator by various methods.
- Able to find the $X_d/X_q$ ratio of alternator and asses the performance of three–phase synchronous motor.
III Year – I SEMESTER

CONTROL SYSTEMS LAB

Learning Objectives:

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

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor
13. Potentiometer as an error detector

Learning Outcomes

- Able to analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchronous motors.
- Able to design P, PI, PD and PID controllers
- Able to design lag, lead and lag–lead compensators
- Able to control the temperature using PID controller
- Able to determine the transfer function of D.C.motor
- Able to control the position of D.C servo motor performance
Learning Objectives:
- To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
- To understand testing of transformer oil.

Any 10 of the following experiments are to be conducted

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer wattmeter using phantom loading
3. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
7. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
8. Calibration of LPF wattmeter by direct loading.
12. Dielectric oil testing using H.T test Kit.
13. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polarform.

Learning Outcomes:
- To be able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- To be able to test transformer oil for its effectiveness.
- To be able to measure the parameters of inductive coil.
Objectives:
*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

Unit I: Introduction to Intellectual Property Rights (IPR)

Unit II: Copyrights and Neighboring Rights

Unit III: Patents

Unit IV: Trademarks

Unit V: Trade Secrets
Unit VI: Cyber Law and Cyber Crime


- Relevant Cases Shall be dealt where ever necessary.

Outcome:
* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
* Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

References:

6. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
Preamble:

This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors.

Learning Objectives:

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

UNIT–I:
Fundamentals of Electric Drives


UNIT–II:
Controlled Converter Fed DC Motor Drives


UNIT–III:
DC–DC Converters Fed DC Motor Drives

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excitedDC motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operation – Closed loop operation (qualitative treatment only).

UNIT–IV:
Stator side control of 3-phase Induction motor Drive

Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor byPWMVoltage source inverter – Closed loop v/f control of induction motor drives (qualitative treatment only).
UNIT–V:
Rotor side control of 3-phase Induction motor Drive

UNIT–VI:
Control of Synchronous Motor Drives
Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (qualitative treatment only).– Variable frequency control– Pulse width modulation.

Learning Outcomes:
After completion of the course, students will be able to:
- Explain the fundamentals of electric drive and different electric braking methods.
- Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
- Describe the converter control of dc motors in various quadrants of operation
- Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- Differentiate the stator side control and rotor side control of three phase induction motor.
- Explain the speed control mechanism of synchronous motors

Text Books:

Reference Books:
1. Electric Motors and Drives Fundamentals, Types and Applications, by Austin Hughes and Bill Drury, Newnes.
3. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI
The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of $Z_{bus}$ and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

**Learning Objectives:**
- To develop the impedance diagram (p.u) and formation of $Y_{bus}$
- To study the different load flow methods.
- To study the concept of the $Z_{bus}$-building algorithm.
- To study short circuit calculation for symmetrical faults.
- To study the effect of unsymmetrical faults and their effects.
- To study the rotor angle stability of power systems.

**UNIT –I:**
**Per Unit Representation & Topology**
Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of $Y$–bus matrix by singular transformation and direct inspection methods.

**UNIT –II:**
**Power Flow Studies**

**UNIT –III:**
**Z–Bus formulation**
Formation of $Z$–Bus: Partial network– Algorithm for the Modification of $Z_{bus}$ Matrix for addition element for the following cases: Addition of element from a new bus to reference–Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of $Z$–Bus for the changes in network ( Problems).

**UNIT – IV:**
**Symmetrical Fault Analysis**
UNIT –V:
Symmetrical Components & Fault analysis

UNIT – VI:
Power System Stability Analysis

`Learning Outcomes:
• Able to draw impedance diagram for a power system network and to understand per unit quantities.
• Able to form aYbus and Zbus for a power system networks.
• Able to understand the load flow solution of a power system using different methods.
• Able to find the fault currents for all types faults to provide data for the design of protective devices.
• Able to find the sequence components of currents for unbalanced power system network.
• Able to analyze the steady state, transient and dynamic stability concepts of a power system.

Text Books:

Reference Books:
Preamble:

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, PIC, architecture, programming in C.

Learning objectives:

- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices
- To understand how to develop cyber physical systems

UNIT–I:
Introduction to Microprocessor Architecture

UNIT–II:
Minimum and Maximum Mode Operations
Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:
I/O Interface

UNIT–IV:
Introduction to 8051 Micro Controller

UNIT– V:
PIC Architecture
Block diagram of basic PIC 18 micro controller, registers I/O ports.
UNIT– VI:
Programming in C for PIC
Data types, I/O programming, logical operations, data conversion

Learning Outcomes:
- To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability
- To be able to program mp and mc
- To be able to interface mp and mc with other electronic devices
- To be able to develop cyber physical systems

Text Books:
2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18, - Muhammad Ali Mazidi, RolindD.Mckinay , Danny causey -Pearson Publisher 21st Impression.

Reference Books:
OBJECTIVES:

• To be familiar with basic techniques of object oriented principles and exception handling using C++
• To be familiar with the concepts like Inheritance, Polymorphism
• Solve problems using data structures such as linear lists, stacks, queues, hash tables
• Be familiar with advanced data structures such as balanced search trees, AVL Trees, and B Trees.

UNIT-I: ARRAYS
Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++ Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Sparse Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES
Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

UNIT-IV: TREES
Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Trees, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.
UNIT-V: GRAPHS
The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal’s Algorithm, Prim’s Algorithm, Sollin’s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

UNIT-VI: SORTING
Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

OUTCOMES:
- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

TEXT BOOKS:

REFERENCE BOOKS:
1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
UNIVERSITY OF MYSORE
BANGALORE REGION

III YEAR – II SEMESTER

UNIX AND SHELL PROGRAMMING
OPEN ELECTIVE

OBJECTIVES:

• Written technical communication and effective use of concepts and terminology.

• Facility with UNIX command syntax and semantics.

• Ability to read and understand specifications, scripts and programs.

• Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

UNIT-I
Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

UNIT-III

UNIT-IV
Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V
UNIT-VI

OUTCOMES:
- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

TEXT BOOKS:
1. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Parson.
2. Unix programming environment by Brain W. Kernighan & Rob Pike, Pearson.

REFERENCE BOOKS:
1. Unix and shell programming by B.M. Harwani, OXFORD university press.
OOPs through Java

OBJECTIVE:
- To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
- To introduce object-oriented concepts in C++ and Java.

Programming:

1. Write a Programme that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.

2. Write a Programme to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks “What distance will you travel?” On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

3. Write a C++ Program to illustrate Enumeration and Function Overloading.

4. Write a C++ Program to illustrate Scope and Storage class.

5. Implementation of ADT such as Stack and Queues.

6. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading.

7. Write a Program to illustrate Static member and methods.

8. Write a Program to illustrate Bit fields.

9. Write a Program to overload as binary operator, friend and member function.

10. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function.

11. Write a C++ Program to illustrate Iterators and Containers.

12. Write a C++ Program to illustrate function templates.

13. Write a C++ Program to illustrate template class.

14. Write C++ Programs and incorporating various forms of Inheritance.

15. Write a C++ Program to illustrate Virtual functions.

16. To write a C++ program to find the sum for the given variables using function with default arguments.

17. To write a C++ program to find the value of a number raised to its power that demonstrates a function using call by value.

18. To write a C++ program and to implement the concept of Call by Address.
19. To write a program in C++ to prepare a student Record using class and object

20. To implement the concept of unary operator overloading by creating a C++ program.

21. Write a C++ program for swapping two values using function templates

22. Write a C++ program to implement a file handling concept using sequential access.

OUTCOMES:

- Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities
VLSI DESIGN

Objectives:

The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

Outcomes:

At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

Syllabus:

Unit-I:

Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. I_d versus V_d Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology. (Text Book-1)

Unit-II:

Unit-III:

**Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

**Scaling of MOS Circuits:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)

Unit-IV:


**Design for Testability:** Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

(Text Book-2)

Unit-V:

**FPGA Design:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

**Introduction to synthesis:** Logic synthesis, RTL synthesis, High level Synthesis.

(Reference Text Book-1)

Unit-VI:

**Introduction to Low Power VLSI Design:** Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

(Text Book-2)

**Text Books:**


**References:**

1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
ROBOTICS
(Open Elective)

OBJECTIVES:
- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

UNIT- I:
Introduction
Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

UNIT-II:
Orientations and frames, Mappings

UNIT- III:
Robot Drives and Power Transmission Systems
Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

UNIT -IV:
Manipulators
Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT- V:
Robot End Effectors

UNIT -VI:
Path planning & Programming
Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.
OUTCOMES:

- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot
  Kinematics and programming.

TEXT BOOKS:

3. Mikell P. Groover et al., "Industrial Robots - Technology, Programming and

REFERENCE BOOKS:

1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering
   2006.
2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and
   Intelligence", McGraw Hill, 1987
NEURAL NETWORKS AND FUZZY LOGIC
(Open Elective)

Preamble:
This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

Learning Objectives:
- To understand artificial neuron models.
- To understand learning methods of ANN.
- To utilize different algorithms of ANN.
- To distinguish between classical and fuzzy sets.
- To understand different modules of fuzzy controller.
- To understand applications of neural networks and fuzzy logic.

Unit – I: Introduction to Neural Networks

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

Unit–III: Multilayer feed forward Neural Networks

Associative Memories
Bidirectional Associative Memories (BAM)-Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Unit – IV: Classical & Fuzzy Sets
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.
UNIT V: Fuzzy Logic Modules
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT VI: Applications
Neural network applications: Process identification, control, fault diagnosis and load forecasting.
Fuzzy logic applications: Load frequency control and Fuzzy classification.

Learning Outcomes:
Students should able to:
- Know different models of artificial neuron.
- Use learning methods of ANN.
- Use different paradigms of ANN.
- Classify between classical and fuzzy sets.
- Use different modules of Fuzzy logic controller.
- Apply Neural Networks and fuzzy logic for real-time applications.

Text Book:
1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by RajasekharanandRai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006

Reference Book:
2. Neural Networks – Simon Hakins, Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
Preamble:
This is an open elective course developed to cater the current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design. The student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition The economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

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

Unit–I:  
Basic Principles of Energy Audit and management

Unit–II:  
Lighting

Unit–III:  
Power Factor and energy instruments

Unit–IV:  
Space Heating and Ventilation

Unit–V  
Economic Aspects and Financial Analysis

Unit–VI:
Computation of Economic Aspects

Learning Outcomes:
Student will be able to
- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

Text Books:

Reference Books:
III Year – II SEMESTER

POWER ELECTRONICS LAB

Learning objectives:
- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- To understand the operation of AC voltage regulator with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter and inverters.

Any 10 of the Following Experiments are to be conducted
1. Study of Characteristics of Thyristor, MOSFET & IGBT.
2. Design and development of a firing circuit for Thyristor.
3. Design and development of gate drive circuits for IGBT.
4. Single-Phase Half controlled converter with R and RL load
5. Single-Phase fully controlled bridge converter with R and RL loads
7. Single-Phase square wave bridge inverter with R and RL Loads
8. Three-Phase fully controlled converter with RL-load.
9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode (CCM) and Discontinuous Conduction Mode (DCM).
10. Design and verification of voltages ripple in buck converter in CCM operation.
12. 3-phase AC-AC voltage regulator with R-load.

Learning outcomes:
- Able to study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
- Able to analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- Able to understand the operation of single phase AC voltage regulator with resistive and inductive loads.
- Able to understand the working of Buck converter, Boost converter, single-phase square wave inverter and PWM inverter.
Learning Objectives:
- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 & PIC 18 micro controllers.

Any 10 of the following experiments are to be conducted:

I. Microprocessor 8086 & Microcontroller 8051

Introduction to MASM/TASM.
1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Interfacing 8255–PPI
5. Interfacing 8259 – Interrupt Controller.
7. Stepper motor control using 8253/8255.
8. Reading and Writing on a parallel port using 8051
9. Timer in different modes using 8051
10. Serial communication implementation using 8051
11. Understanding three memory areas of 00 – FF Using 8051 external interrupts.
12. Interface PIC 18 with an optoisolator
13. Interface PIC 18 with a DC motor

Learning Outcomes:
- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 & PIC 18 micro controllers.
DATASTRUCTURES THROUGH C LAB

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

List of Experiments:

1. Implementation of Singly linked list.
2. Implementation of Doubly linked list.
4. Implementation of Circular Queue
5. Implementation of Binary Search trees.
8. Implementation of Breadth First Search Techniques.
10. Implementation of Prim’s Algorithm.
11. Implementation of Dijkstra’s Algorithm.
12. Implementation of Kruskal’s Algorithm
13. Implementation of MergeSort
14. Implementation of Quick Sort
15. Implementation of Data Searching using divides and conquers technique

OUTCOMES:

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures
Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:

UNIT II: Principles for Harmony:

UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

UNIT V: Engineers’ Duties and Rights:
UNIT VI: Global Issues:

- Related Cases Shall be dealt where ever necessary.

Outcome:
*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
Preamble:
This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

Learning objectives:
- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

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

UNIT – II:
Electric Heating
Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating – Arc furnaces – Direct and indirect arc furnaces

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

UNIT – III:
Illumination fundamentals

UNIT – IV:
Various Illumination Methods
Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting, principle of operation, street lighting and domestic lighting – Conservation of energy.
**UNIT – V:**

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

**UNIT – VI:**

**Electric Traction – II**
Calculations of tractive effort– power –Specific energy consumption for given run– Effect of varying acceleration and braking retardation– Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion– Principles of energy efficient motors– Modern traction motors.

**Learning Outcomes:**
- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- Able to determine the speed/time characteristics of different types of traction motors.
- Able to estimate energy consumption levels at various modes of operation.

**Text Books:**

**Reference Books:**
OBJECTIVES

- To understand the basic operation & performance parameters of differential amplifiers.
- To understand & learn the measuring techniques of performance parameters of OP-AMP.
- To learn the linear and non-linear applications of operational amplifiers.
- To understand the analysis & design of different types of active filters using opamps.
- To learn the internal structure, operation and applications of different analog ICs.
- To Acquire skills required for designing and testing integrated circuits.

UNIT I

UNIT II

UNIT III

UNIT IV
ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

UNIT V

UNIT VI
DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).
TEXT BOOKS:

REFERENCES:
3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

OUTCOMES
- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.
Preamble:
This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

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

UNIT–I:
Economic Operation of Power Systems

UNIT–II:
Hydrothermal Scheduling

UNIT–III:
Unit Commitment

UNIT–IV:
Load Frequency Control-I

UNIT–V:
Load Frequency Control-II
Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case. Tie-line bias control. Load Frequency Control and Economic dispatch control.
UNIT–VI:
Reactive Power Control

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

Text Books:

Reference Books:
4. Power System stability & control, PrabhaKundur,TMH
Preamble:
In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

Learning objectives:
- To provide the basic principles and operation of various types of circuit breakers.
- To study the classification, operation and application of different types of electromagnetic protective relays.
- To explain protective schemes, for generator and transformers.
- To impart knowledge of various protective schemes used for feeders and bus bars.
- To explain the principle and operation of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co–ordination.

UNIT–I:
Circuit Breakers

UNIT–II:
Electromagnetic Protection

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

UNIT–IV:
Feeder and Bus bar Protection
UNIT–V:
Static and Digital Relays
Static relays: Static relay components– Static over current relays– Static distance relay– Micro processor based digital relays

UNIT–VI:
Protection against over voltage and grounding

Learning Outcomes:
- Able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF₆ gas type.
- Ability to understand the working principle and operation of different types of electromagnetic protective relays.
- Students acquire knowledge of faults and protective schemes for high power generator and transformers.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Able to understand different types of static relays and their applications.
- Able to understand different types of over voltages and protective schemes required for insulation co–ordination.

Text Books:
1. Power System Protection and Switchgear by Badari Ram and D.N Viswakarma, TMH Publications
2. Power system protection- Static Relays with microprocessor applications.by T.S.MadhavaRao,TMH

Reference Books:
Preamble:
Electrical Motor is one of the main components of electrical drive. So, in order to develop control strategies for electrical motor drives, it is very essential to have complete knowledge on modeling of electrical machines.

Learning Objectives
- Establish unified theory of rotating machines.
- To understand the concept of phase transformation.
- Analyze different electrical machines for improved performance through modification of their characteristics.
- Develop concepts on mathematical modeling of electrical machines.

UNIT – I
Basic concepts of Modeling
Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron’s primitive Machine-voltage, current and Torque equations.

UNIT – II
DC Machine Modeling

UNIT- III
Reference frame theory & Modeling of single phase Induction Machines
Linear transformation-Phase transformation - three phase to two phase transformation (abc to dq0) and two phase to three phase transformation dq0 to abc -Power equivalence-Mathematical modeling of single phase induction machines.

UNIT – IV
Modeling of three phase Induction Machine

UNIT – V
Modeling of Synchronous Machine
Synchronous machine inductances– voltage equations in the rotor’s dq0 reference frame- electromagnetic torque-current in terms of flux linkages-three synchronous machine model.
UNIT –IV
Modeling of Special Machines
Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

Learning Outcomes:
After completion of this course, students will be able to
- Develop modeling of dc machine
- Apply mathematical modeling concepts to 3-phase Induction machines
- Design control strategies based on dynamic modeling of 3-ph Induction machines and 3-phase synchronous machine.
- Analyze BLDC Machine and switched reluctance machine based on mathematical modeling of BLDCM and SRM.

Text Books:

Reference Books:
2. Dynamic simulation of Electric machinery using Matlab / Simulink – Chee Mun Ong- PHI.
3. Modern Power Electronics and AC Drives - B.K. Bose - PHI
ADVANCED CONTROL SYSTEMS

Preamble:

This subject aims to study state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Learning Objectives:

• Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
• To introduce the concept of controllability and observability. Design by pole placement technique.
• Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
• The Lyapunov’s method of stability analysis of a system.
• Formulation of Euler Laugrange equation for the optimization of typical functionals and solutions.
• Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

UNIT – I:
State space analysis
State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

UNIT – II:
Controllability, observability and design of pole placement

UNIT – III:
Describing function analysis
Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase-plane analysis.

UNIT–IV:
Stability analysis
Stability in the sense of Lyapunov – Lyapunov’s stability and Lypanov’s instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

UNIT–V:
Calculus of variations
Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.
UNIT –VI:  
Optimal control

Linear Quadratic Optimal Regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by Continuous Time Algebraic Riccatti equation (CARE) - Optimal controller design using LQG framework.

Learning Outcomes:
- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using Lyapunov method.
- Minimization of functionals using calculus of variation studied.
- Able to formulate and solve the LQR problem and riccatti equation.

Text Books:
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

Reference Books:
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.
PROGAMMABLE LOGIC CONTROLLERS & APPLICATIONS

Preamble: IN most of the industry applications, computer control is gaining importance, PLC is a industry computer, hence this course PLC makes the students to acquire knowledge required for industry.

Learning Objectives:

- To have knowledge on PLC.
- To acquire the knowledge on programming of PLC.
- To understand different PLC registers and their description.
- To have knowledge on data handling functions of PLC.
- To know how to handle analog signal and converting of A/D in PLC.

Unit I: Introduction
PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

Unit II: PLC Programming
PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

Unit III: Programmable Timers and Counters

Unit IV: Program Control Instructions
Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.

Unit V: Other Instructions

Unit VI: Applications
**Learning Outcomes:** After completion of the course, students are able to:

- Understand the PLCs and their I/O modules.
- Develop control algorithms to PLC using ladder logic.
- Manage PLC registers for effective utilization in different applications.
- Design PID controller with PLC.

**Text Books:**

**Reference Books:**
2. Introduction to Programmable Logic Controllers- Gary Dunning-Cengage Learning.
3. Programmable Logic Controllers – W.Bolton-Elsevier publisher
Preamble:

Electrical and Electronic Instrumentation plays a key role in the industry. With the advancement of technology day to day manual maintenance is replaced by simply monitoring using various instruments. Thus this course plays very important role in overall maintenance of the industry.

Learning Objectives:

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

UNIT–I:
Signals and their representation

UNIT–II:
Transducers

UNIT–III:
Measurement of Non–Electrical Quantities

UNIT–IV:
Digital Voltmeters

UNIT–V:
Oscilloscope
UNIT–VI:
Signal Analyzers

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

Text Books:

Reference Books:
1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/ Prentice Hall of India
4. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.
Preamble:
Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and Genetic & Partial Swarm Optimization algorithms.

Learning Objectives:
• To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
• To state single variable and multi variable optimization problems, without and with constraints.
• To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
• To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
• To introduce evolutionary programming techniques.
• To introduce basic principles of Genetic Algorithms and Partial Swarm Optimization methods.

UNIT – I:
Introduction and Classical Optimization Techniques:

UNIT – II:
Classical Optimization Techniques

UNIT – III:
Linear Programming
UNIT – IV:
**Nonlinear Programming:**
**Unconstrained cases** - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell’s method and steepest descent method.
**Constrained cases** - Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods.Introduction to convex Programming Problem.

UNIT – V:
**Introduction to Evolutionary Methods:**
Evolutionary programming methods - Introduction to Genetic Algorithms (GA)– Control parameters –Number of generation, population size, selection, reproduction, crossover and mutation – Operator selection criteria – Simple mapping of objective function to fitness function – constraints – Genetic algorithm steps – Stopping criteria –Simple examples.

UNIT – VI:
**Introduction to Swarm Intelligence Systems:**
Swarm intelligence programming methods - Basic Partial Swarm Optimization – Method – Characteristic features of PSO procedure of the global version – Parameters of PSO (Simple PSO algorithm – Operators selection criteria – Fitness function constraints) – Comparison with other evolutionary techniques – Engineering applications of PSO.

**Learning Outcomes:**
The student should be able to:
- State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
- Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
- Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
- Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
- Able to apply Genetic algorithms for simple electrical problems.
- Able to solve practical problems using PSO.

**Text Books**

**Reference Books:**
4. Linear Programming by G.Hadley.
Preamble:
Power quality is a major problem for utilities and customers. Customers using sensitive critical loads need quality power for proper operation of the electrical equipment. It is important for the student to learn the power quality issues and improvement measures provided by the utility companies. This course covers the topics on voltage and current imperfections, harmonics, voltage regulation, power factor improvement, distributed generation, power quality monitoring and measurement equipment.

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

Unit–I: Introduction

Unit–II: Voltage imperfections in power systems

Unit–III: Voltage Regulation and power factor improvement:

Unit–IV: Harmonic distortion and solutions

Unit–V: Distributed Generation and Power Quality

Unit–VI: Monitoring and Instrumentation
Learning Outcomes:
At the end of this course the student should be able to
• Differentiate between different types of power quality problems.
• Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
• Analyze power quality terms and power quality standards.
• Explain the principle of voltage regulation and power factor improvement methods.
• Demonstrate the relationship between distributed generation and power quality.
• Explain the power quality monitoring concepts and the usage of measuring instruments.

Textbooks:

Reference Books:
5. Power Quality c.shankaran, CRC Press, 2001
SPECIAL ELECTRICAL MACHINES

Preamble:

This is an advanced course on electrical machines. Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors and linear motors.

Learning Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor.
- To explain the theory of travelling magnetic field and applications of linear motors.

Unit I:
Permanent magnet materials and PMDC motors
Introduction-classification of permanent magnet materials used in electrical machines-minor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-Temperature effects: reversible and irreversible losses-high temperature effects-reversible losses-Irreversible losses recoverable by magnetization-Mechanical properties, handling and magnetization-Application of permanent magnets in motors-power density-operating temperature range-severity of operation duty.

Unit II:
Stepper Motors

Unit III:
Switched Reluctance Motors
Construction – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

Unit IV:
Square Wave Permanent Magnet Brushless DC Motor
Types of constructions – Surface mounted and interior type permanent magnet – Principle of operation of BLDC motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency- Square wave brushless motors with 120° and 180° magnetic areas commutation.
Unit V:
Sine wave Permanent Magnet Brushless Motor
Torque and EMF equations – Phasor Diagram – Circle diagram – Torque/speed characteristics – Comparison between square wave and sine wave permanent magnet motors - Applications.

Unit VI:
Linear Induction Motors (LIM)
Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one sided LIM with back iron- equivalent circuit of LIM.

Learning Outcomes:
The student should be able to
- Distinguish between brush dc motor and brush less dc motor.
- Explain the performance and control of stepper motors, and their applications.
- Explain theory of operation and control of switched reluctance motor.
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

Text Books:
ELECTRICAL SIMULATION LAB

Learning objectives:
- To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full converter and PWM inverter.
- To simulate transmission line by incorporating line, load and transformer models.
- To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).

Following experiments are to be conducted:
1. Simulation of transient response of RLC circuits
   a. Response to pulse input
   b. Response to step input
   c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current.
3. Simulation of single-phase full converter using RLE loads and single phase AC voltage controller using RL loads
4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order
5. Simulation of Boost and Buck converters.
7. Simulation of D.C separately excited motor using transfer function approach.

Any 2 of the following experiments are to be conducted:
1. Modeling of transformer and simulation of lossy transmission line.
2. Simulation of single phase inverter with PWM control.
3. Simulation of three phase full converter using MOSFET and IGBTs.
4. Transient analysis of single machine connected to infinite bus (SMIB).

Learning outcomes:
- Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full converter and PWM inverter.
- Able to simulate transmission line by incorporating line, load and transformer models.
- Able to perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).

Reference Books:
2. Pspice for circuits and electronics using PSPICE – by M.H. Rashid, M/s PHI Publications
3. Pspice A/D user’s manual – Microsim, USA
4. Pspice reference guide – Microsim, USA
5. MATLAB user’s manual – Mathworks, USA
6. MATLAB – control system tool box – Mathworks, USA
7. SIMULINK user’s manual – Mathworks, USA
9. SEQUEL – A public domain circuit simulator available at www.ee.iitb.ac.in/~sequel
Learning Objectives:
To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

Any 10 of the Following experiments are to be conducted:

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission line.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.
8. Load flow studies using Gauss-seidel method
10. Transient Stability Analysis
11. Load frequency control with & without control
12. Load frequency control with control
13. Economic load dispatch with & without losses

Learning Outcomes:
The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch center.
Preamble:
In recent years digital controllers have become popular due to their capability of accurately performing complex computations at high speeds and versatility in leading nonlinear control systems. In this context, this course focuses on the analysis and design of digital control systems.

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

UNIT – I:
Introduction and signal processing
Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:
z–transformations

UNIT–III:
State space analysis and the concepts of Controllability and observability

UNIT – IV:
Stability analysis

UNIT – V:
Design of discrete–time control systems by conventional methods
Transient and steady state specifications – Design using frequency response in the w–plane for lag and lead compensators – Root locus technique in the z–plane.
UNIT – VI:
State feedback controllers:
Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman’s formula.

Learning outcomes:
- The students learn the advantages of discrete time control systems and the “know how” of various associated accessories.
- The learner understand z–transformations and their role in the mathematical analysis of different systems (like Laplace transforms in analog systems).
- The stability criterion for digital systems and methods adopted for testing the same are explained.
- Finally, the conventional and state space methods of design are also introduced.

Text Book:

Reference Books:
Preamble:
This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Faults and protections, Harmonics and Filters. It also deals with Reactive power control and Power factor improvements of the system.

Learning Objectives:
- To Understand basic concepts of HVDC Transmission.
- To analyze the converter configuration.
- To Know the control of converter and HVDC Transmission.
- To Understand the significance of reactive power control and AC/Dc load flow.
- To Know different converter faults, protection and effect of harmonics.
- To leave low pass and high pass filters.

UNIT – I
Basic Concepts

UNIT – II
Analysis of HVDC Converters

UNIT – III
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-IV
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.

Power Flow Analysis In AC/DC Systems

UNIT-V
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.

Harmonics
UNIT-VI
Filters
Types of AC filters, Design of Single tuned filters – Design of High pass filters.

Learning Outcomes:
The Student shall be able to
- Learn different types of HVDC levels and basic concepts
- Know the operation of converters
- Acquire control concept of reactive power control and AC/DC load flow.
- Understand converter faults, protection and harmonic effects
- Design low pass and high pass filters

Text Books:
2. HVDC Transmission by S. Kamakshaiah and V. Kamaraju-Tata McGraw–Hill

Reference Books:
ELECTRICAL DISTRIBUTION SYSTEMS

Preamble:
This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

Learning Objectives
- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the concepts of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation for power factor improvement.
- To study the effect of voltage control on distribution system.

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).

UNIT – II:
Substations
Location of substations: Rating of distribution substation – Service area with ‘n’ primary feeders – Benefits and methods of optimal location of substations.
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 – III:
System Analysis
Voltage drop and power–loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems - Three phase balanced primary lines.

UNIT – IV:
Protection
Coordination
Coordination of protective devices: General coordination procedure – Various types of coordinated operation of protective devices - Residual Current Circuit Breaker

UNIT – V:
Compensation for Power Factor Improvement
UNIT – VI:
Voltage Control

Learning Outcomes:
• Able to understand various factors of distribution system.
• Able to design the substation and feeders.
• Able to determine the voltage drop and power loss
• Able to understand the protection and its coordination.
• Able to understand the effect of compensation for p.f improvement.
• Able to understand the effect of voltage control.

Text Book:

Reference Books:
Preamble:

With the growth of power, HV power transmission has become an important subject. The performance of generating equipment requires knowledge of different phenomena occurring at higher voltage. Thus evaluations of various insulating materials are required for protection of HV equipments. Keeping this in view the course is designed to understand various phenomena related to breakdown study and withstand characteristics of insulating materials. The course also describes the generation and measurement of DC, AC and Impulse voltages as well various testing techniques.

Learning Objectives:

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

UNIT–I:
Introduction to High Voltage Technology
Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II:
Break down phenomenon in gaseous, liquid and solid insulation

UNIT–III:
Generation of High voltages and High currents
Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

UNIT–IV:
Measurement of high voltages and High currents
Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.
UNIT–V:
Non–destructive testing of material and electrical apparatus

UNIT–VI:
High voltage testing of electrical apparatus

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

Text Books:

Reference Books:
FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

Preamble:
Flexible Alternating Current Transmission System controllers have become a part of modern power system. It is important for the student to understand the principle of operation of series and shunt compensators by using power electronics. As the heart of many power electronic controllers is a voltage source converter (VSC), the student should be acquainted with the operation and control of VSC. Two modern power electronic controllers are also introduced.

Learning Objectives:
- To learn the basics of power flow control in transmission lines using FACTS controllers
- To explain operation and control of voltage source converter.
- To understand compensation methods to improve stability and reduce power oscillations of a power system.
- To learn the method of shunt compensation using static VAR compensators.
- To learn the methods of compensation using series compensators
- To explain operation of Unified Power Flow Controller (UPFC).

Unit–I: Introduction to FACTS

Unit–II: Voltage source and Current source converters

Unit–III: Shunt Compensators–1
Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping.

Unit–IV: Shunt Compensators–2
Thyristor Switched Capacitor(TSC)–Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.
Unit V:  
**Series Compensators**  
Static series compensators: Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

Unit–VI:  
**Combined Controllers**  
Schematic and basic operating principles of Unified Power Flow Controller (UPFC).– Application on transmission lines.

**Learning Outcomes:**  
The student should be able to  
- Understand power flow control in transmission lines using FACTS controllers.  
- Explain operation and control of voltage source converter.  
- Analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.  
- Explain the method of shunt compensation using static VAR compensators.  
- Understand the methods of compensations using series compensators.  
- Explain operation of Unified Power Flow Controller (UPFC).

**Text Books:**  

**Reference Books:**  
1. “Flexible ac transmission system (FACTS)” Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.  
POWER SYSTEM REFORMS  
(Elective III)

Preamble:

This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment

Learning Objectives:

• To study fundamentals of power system deregulation and restructuring.
• To study available transfer capability.
• To study congestion management
• To study various electricity pricing methods.
• To study operation of power system in deregulated environment.
• To study importance of Ancillary services management.

UNIT–I
Over view of key issues in electric utilities

UNIT–II
Available Transfer Capability (ATC)

UNIT–III
Congestion Management
Introduction to congestion management – Methods to relieve congestion

UNIT–IV
Electricity Pricing:
Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

UNIT–V
Power system operation in competitive environment:

UNIT–VI
Ancillary Services Management:
Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.
Learning Outcomes:

- Will understand importance of power system deregulation and restructuring.
- Able to compute Available Transfer Capability.
- Will understand transmission congestion management.
- Able to compute electricity pricing in deregulated environment.
- Will be able to understand power system operation in deregulated environment.
- Will understand importance of ancillary services.

Text Books:


Reference Books:

1. Loi Lei Lai; “Power system Restructuring and Deregulation”, Jhon Wiley & Sons Ltd., England.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH
COURSE STRUCTURE AND SYLLABUS

For

MECHANICAL ENGINEERING
(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India
I Year - I Semester

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**Total Credits** 24

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I Year - II Semester

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**Total Credits** 24
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### III YEAR - II Semester

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<td>6. Green Engineering Systems</td>
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### IV Year - I Semester

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### IV Year - II Semester

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Total Course Credits = 48 + 44 + 42 + 46 = 180
SYLLABUS

I Year - I Semester

ENGLISH - I

L T P C
4 0 0 3

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.
READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

   (80% for the best of two and 20% for the other)

   Assignments= 5%

   End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

(R-16 Regulations)

**DETAILED TEXTBOOK:**

**ENGLISH FOR ENGINEERS AND TECHNOLOGISTS,** Published by **Orient Blackswan Pvt Ltd**

**NON-DETAILED TEXTBOOK:**

**PANORAMA: A COURSE ON READING,** Published by **Oxford University Press India**

The course content along with the study material is divided into six units.

**UNIT 1:**

1. 'Human Resources' from English for Engineers and Technologists.

**OBJECTIVE:**

To develop human resources to serve the society in different ways.

**OUTCOME:**

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

**OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**

Acquisition of writing skills

**UNIT 2:**

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

**OBJECTIVE:**

To highlight road safety measures whatever be the mode of transport.

**OUTCOME:**

The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama: A Course on Reading'

**OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.
OUTCOME:
Acquisition of writing skills

UNIT 3:
1. 'Evaluating Technology' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the advantages and disadvantages of technology.

OUTCOME:
The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 4:
1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

OBJECTIVE:
To bring into focus different sources of energy as alternatives to the depleting sources.

OUTCOME:
The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading

OBJECTIVE:
To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:
Acquisition of writing skills

UNIT 5:
1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:
To highlight the fact that animals must be preserved because animal life is precious.
**OUTCOME:**
The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

**UNIT 6:**
1. 'Safety and Training' from English for Engineers and Technologists.

**OBJECTIVE:**
To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

**OUTCOME:**
The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

**OBJECTIVE:**
To develop extensive reading skill and comprehension for pleasure and profit.

**OUTCOME:**
Acquisition of writing skills

**NOTE:**
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

**OVERALL COURSE OUTCOME:**
1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.
MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes
One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:

1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jacobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.


UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, sin ax, cos ax, polynomials in x, $e^{ax}V(x)$, xV(x)- Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

UNIT III: 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 (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:

Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor’s and Mc Laurent’s series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).
UNIT V: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(\alpha x+b y), \cos(\alpha x+b y), x^n y^n$. Classification of second order partial differential equations.

Text Books:


Reference Books:

3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

**Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace and automotive industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
- Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced. Also lubrication is introduced.

**UNIT I: HIGH POLYMERS AND PLASTICS**

*Polymerisation:*- Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

*Elastomers:*- Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.


**UNIT II: FUEL TECHNOLOGY**


*Explosives:*- Rocket fuels

**UNIT III: ELECTROCHEMICAL CELLS AND CORROSION**

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion :-* Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).
UNIT IV: CHEMISTRY OF ADVANCED MATERIALS


Liquid crystals:- Introduction – Types – Applications

Super conductors:- Type –I, Type II – Characteristics and applications

Green synthesis:- Type - 3or 4 methods of synthesis with examples – R₄M₄ principles

UNIT V: WATER TECHNOLOGY


UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS

Refractories: - Definition, characteristics, classification, properties, failure of refractories

Lubricants: - Definition, function, Theory and mechanism of lubricants, properties (Definition and importance)

Cement: - Constituents, manufacturing, hardening and setting, deterioration of cement

Insulators: - Thermal and electrical insulators

Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells

Outcome: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.

Standard Books:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

Reference Books:
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.


Friction: Introduction, limiting friction and impending motion, coulomb’s laws of dry friction, coefficient of friction, cone of friction

UNIT II

Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.


UNIT – III

Objectives: The students are to be exposed to concepts of centre of gravity.

Centroid: Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV

Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.
UNIT – V

Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.


UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion


TEXT BOOKS :


REFERENCES :

Learning objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

UNIT-II:
Introduction to C Programming- Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III:
Control Flow-Relational Expressions - Logical Operators:
Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

UNIT-IV
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:
Arrays & Strings
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions
UNIT-VI:
Pointers, Structures, Files

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

Text Books:
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:
3. Programming in C, ReemaThareja, OXFORD.
Course Learning Objectives:

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT – II Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT – IV Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.


The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

REFERENCE:

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
1. Introduction to Chemistry laboratory – Molarity, Normality. Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

2. Trial experiment - Determination of HCl using standard Na₂CO₃ solution.

3. Determination of alkalinity of a sample containing Na₂CO₃ and NaOH.

4. Determination of KMnO₄ using standard Oxalic acid solution.

5. Determination of Ferrous iron using standard K₂Cr₂O₇ solution.

6. Determination of Copper using standard K₂Cr₂O₇ solution.


8. Determination of Copper using standard EDTA solution.


10. Determination of pH of the given sample solution using pH meter.

11. Conductometric titration between strong acid and strong base.

12. Conductometric titration between strong acid and weak base.

13. Potentiometric titration between strong acid and strong base.

14. Potentiometric titration between strong acid and weak base.

15. Determination of Zinc using standard EDTA solution.

16. Determination of Vitamin – C.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books
PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:
To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:
A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:
1. WHY study Spoken English?
2. Making Inqueries on the phone, thanking and responding to Thanks
   Practice work.

UNIT 2:
1. Responding to Requests and asking for Directions
   Practice work.

UNIT 3:
1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:
1. Letters and Sounds
   Practice work.

UNIT 5:
1. The Sounds of English
   Practice work.
UNIT 6:

1. Pronunciation
2. Stress and Intonation
   Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

<table>
<thead>
<tr>
<th>Body language</th>
<th>Fluency &amp; Audibility</th>
<th>Clarity in Speech</th>
<th>Neutralization of accent</th>
<th>Appropriate Language</th>
<th>Total 10 marks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesture &amp; Postures</td>
<td>Eye Contact</td>
<td></td>
<td></td>
<td>Grammar</td>
<td>Vocabulary &amp; expressions</td>
<td></td>
</tr>
</tbody>
</table>

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Elias, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
OBJECTIVES:
• Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
• Acquire knowledge about the basic concept of writing a program.
• Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
• Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
• Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a) Write a C Program to Find Whether the Given Number is
   i) Prime Number
   ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)
**Exercise – 7** Functions - Continued
Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion. (use factorial function)

**Exercise – 8** Arrays
Demonstration of arrays
  a) Search-Linear.
  b) Sorting-Bubble, Selection.
  c) Operations on Matrix.

**Exercises - 9** Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

**Exercise - 10** Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

**Exercise – 11** Dynamic Memory Allocations
  a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

  Understand the difference between the above two programs

**Exercise – 12** Strings
a) Implementation of string manipulation operations with library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations without library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare

**Exercise -13** Files
a) Write a C programming code to open a file and to print it contents on screen.
b) Write a C program to copy files

**Exercise - 14** Files Continued
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.
OUTCOMES:

• Apply and practice logical ability to solve the problems.

• Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

• Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs

• Understand and apply the in-built functions and customized functions for solving the problems.

• Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

• Document and present the algorithms, flowcharts and programs in form of user-manuals

• Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.
Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students participate in Just a Minute talks.

READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

**WRITING SKILLS:**

**Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write technical reports.

**Methodology:**

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventions permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

**Assessment Procedure: Theory**

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%
   
   (80% for the best of two and 20% for the other)
   
   Assignments= 5%
   
   End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.
The following text books are recommended for study in I B. Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regulations)

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cengage learning

The course content along with the study material is divided into six units.

UNIT 1:
1. 'The Greatest Resource- Education' from English Encounters

OBJECTIVE:
Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

OUTCOME:
The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. 'A P J Abdul Kalam' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

OUTCOME:
Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:
1. 'A Dilemma' from English Encounters

OBJECTIVE: The lesson centres on the pros and cons of the development of science and technology.

OUTCOME: The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

OUTCOME:
The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:
1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.
OBJECTIVE: The lesson depicts the symptoms of Cultural Shock and the aftermath consequences.

OUTCOME:
The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

OUTCOME:
The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it.

UNIT 4:
1. 'The Lottery' from English Encounters.

OBJECTIVE:
The lesson highlights insightful commentary on cultural traditions.

OUTCOME:
The theme projects society’s need to re-examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

OBJECTIVE:
The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

UNIT 5:
1. 'The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:
The essay presents several health disorders that spring out due to environmental changes.

OUTCOME:
The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. 'Prafulla Chandra Ray' from The Great Indian Scientists.
OBJECTIVE:
The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:
Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:
1. 'The Chief Software Architect' from English Encounters

OBJECTIVE:
The lesson supports the developments of technology for the betterment of human life.

OUTCOME:
Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan from The Great Indian Scientists.

OBJECTIVE:
The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:
The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:
All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

MODEL QUESTION PAPER FOR THEORY

PART-I
Six short answer questions on 6 unit themes
One question on eliciting student's response to any of the themes

PART-II
Each question should be from one unit and the last question can be a combination of two or more units.
Each question should have 3 sub questions: A, B & C
A will be from the main text: 5 marks
B from non-detailed text: 3 marks
C on grammar and Vocabulary: 6 marks
Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

UNIT I: Solution of Algebraic and Transcendental Equations:

UNIT II: Interpolation:

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

UNIT IV: Fourier Series:
Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet’s conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V: Applications of PDE:
Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

UNIT VI: Fourier Transforms:
Text Books:

Reference Books:
1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
Course Objectives:
1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Determine rank, Eigen values and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

UNIT II: Eigen values - Eigen vectors and Quadratic forms:
Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:
Curve tracing: Cartesian, Polar and Parametric forms.
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.

UNIT IV: Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Applications: Evaluation of integrals.
UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators - Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

Text Books:


Reference Books:

OBJECTIVES: Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv. KKD. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart concepts of Optical Interference, Diffraction and Polarization required to design instruments with higher resolution - Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the Structure-property relationship exhibited by solid crystal materials for their utility.
- Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.
- To explore the Nuclear Power as a reliable source required to run industries
- To impart the knowledge of materials with characteristic utility in appliances.

UNIT-I
INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

UNIT-II
DIFFRACTION: Fraunhofer diffraction at single slit cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III
POLARIZATION: Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter)

UNIT-IV
ACOUSTICS: Reverberation time - Sabine’s formula – Acoustics of concert-hall.
ULTRASONICS: Production - Ultrasonic transducers- Non-Destructive Testing –Applications.

UNIT-V
CRYSTALLOGRAPHY & X-RAY DIFFRACTION: Basis and lattice – Bravais systems- Symmetry elements- Unit cell- packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes – Bragg’s law.

UNIT-VI
MAGNETISM: Classification based on Field, Temperature and order/disorder –atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro).
**Outcome:** Construction and working details of instruments, i.e., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.

**Text Books:**

**Reference books:**
2. Lasers and Non-Linear optics by B.B.Laud, Newage international publishers (2008)
Preamble:

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

- To learn the basic principles of electrical circuital law’s and analysis of networks.
- To understand the principle of operation and construction details of DC machines & Transformers.
- To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
- To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPS.
- To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I

Electrical Circuits:


UNIT - II

Dc Machines:

Principle of operation of DC generator – EMF equation - Types of DC machine – Torque equation – Applications – Three point starter - Speed control methods of DC motor – Swinburne’s Test.

UNIT - III

Transformers:


UNIT - IV

AC Rotating Machines:

UNIT V

Rectifiers & Linear ICs:

PN junction diodes - Diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non-inverting, integrator and differentiator).

UNIT VI

Transistors:

PNP and NPN junction transistor, transistor as an amplifier - Transistor amplifier - Frequency response of CE amplifier - Concepts of feedback amplifier.

Learning Outcomes:

- Able to analyse the various electrical networks.
- Able to understand the operation of DC generators, 3-point starter and DC machine testing by Swinburne’s Test.
- Able to analyse the performance of single-phase transformer.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to analyse the operation of half wave, full wave bridge rectifiers and OP-AMPs.
- Able to explain the single stage CE amplifier and concept of feedback amplifier.

Text Books:


Reference Books:
1. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group
2. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
5. Industrial Electronics by G.K. Mittal, PHI
Objective: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT II

Objective: To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP, VP or PP)

UNIT III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

UNIT IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.
UNIT VI

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications

REFERENCE BOOKS:

4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

OBJECTIVES:

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. Debating
   Practice work

UNIT 2:

1. Group Discussions
   Practice work

UNIT 3:

1. Presentation Skills
   Practice work

UNIT 4:

1. Interview Skills
   Practice work

UNIT 5:

1. Email,
2. Curriculum Vitae
   Practice work

UNIT 6:

1. Idiomatic Expressions
2. Common Errors in English
   Practice work
Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education
Objective: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

LIST OF EXPERIMENTS:
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
ENGINEERING / APPLIED PHYSICS - VIRTUAL LABS – ASSIGNMENTS
(Constitutes 5% marks of 30marks of Internal-component)

Objective: Training Engineering students to prepare a technical document and improving their writing skills.

LIST OF EXPERIMENTS
1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster’s angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson’s interferometer
13. Black body radiation

URL: www.vlab.co.in

Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a technical/mini-project/ experimental report with scientific temper.
ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP

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

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

Trade:

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

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

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

IT WORKSHOP

OBJECTIVES:

- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. Operating System Installation - Install Operating Systems like Windows, Linux along with necessary Device Drivers.

3. MS-Office / Open Office
   b. Spread Sheet - organize data, usage of formula, graphs, charts.
   c. Power point - features of power point, guidelines for preparing an effective presentation.
   d. Access- creation of database, validate data.
4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB**- basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

**OUTCOMES:**

- Common understanding of concepts, patterns of decentralization implementation in Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices ‡
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

**TEXT BOOKS:**

5. Scott Mueller’s Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
Course Objective: To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

UNIT – I
Learning Objectives: To know the basic concepts of bonds in metals and alloys. To understand the basic requirements for the formation of solid solutions and other compounds.

UNIT –II
Learning objectives: To understand the regions of stability of the phases that can occur in an alloy system in order to solve the problems in practical metallurgy.
Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd and Fe-Fe₃C.

UNIT –III
Learning objectives: To study the basic differences between cast irons and steels, their properties and practical applications.
Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – IV
Learning objectives: To study the affect of various alloying elements on iron-iron carbide system. To understand the various heat treatment and strengthening processes used in practical applications.

UNIT – V
Learning objectives: To study the properties and applications of widely used non-ferrous metals and alloys so as to use the suitable material for practical applications.
UNIT – VI

Learning objectives: To study the properties and applications of ceramic, composite and other advanced materials so as to use the suitable material for practical applications.

Ceramic and composite materials: Crystalline ceramics, glasses, cermets, abrasive materials, nanomaterials – definition, properties and applications of the above.


Text Books:

1. Introduction to Physical Metallurgy - Sidney H. Avener - McGrawHill

References:

1. Material Science and Metallurgy – Dr. V.D.Kodgire.
2. Materials Science and engineering - Callister & Baalasubrahmanyam
4. Material science and Engineering - V. Rahghavan
Common to Mechanical, Aeronautical & Automobile Engineering.

Objective: The students completing this course are expected to understand the basic terms like stress, strain, poisson's ratio...etc and different stresses induced in beams, thin cylinders, thick cylinders, columns. Further, the student shall be able to understand the shear stresses in circular shafts.

UNIT – I

Objective: After studying this unit student will know the basic terms like stress, strain, poisson's ratio...etc and stresses in bars of varying cross sections, composite bars, thermal stress in members, stresses on inclined planes with analytical approach and graphical approach, strain energy under different loadings and also problem solving techniques.

SIMPLE STRESSES & STRAINS:

- Elasticity and plasticity
- Types of stresses & strains—Hooke’s law—stress strain diagram for mild steel—Working stress—Factor of safety—Lateral strain, Poisson’s ratio & volumetric strain—Bars of varying section—composite bars—Temperature stresses—Complex Stresses—Stresses on an inclined plane under different uniaxial and biaxial stress conditions—Principal planes and principal stresses—Mohr’s circle—Relation between elastic constants, Strain energy—Resilience—Gradual, sudden, impact and shock loadings.

UNIT – II

Objective: After studying this unit student will know the construction of shear force diagrams and bending moment diagrams to the different loads for the different support arrangements and also problem solving techniques.

SHEAR FORCE AND BENDING MOMENT:

- Definition of beam—Types of beams—Concept of shear force and bending moment—S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads—Point of contra flexure—Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Objective: After studying this unit student will know the bending and shear stress induced in the beams which are made with different cross sections like rectangular, circular, triangular, I, T angle sections and also problem solving techniques.

FLEXURAL STRESSES:


SHEAR STRESSES:

- Derivation of formula—Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.
UNIT – IV

Objective: After studying this unit student will know how to finding slope and deflection for different support arrangements by Double integration method, Macaulay’s method and Moment-Area and also problem solving techniques.

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L uniformly varying load. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams, Statically Indeterminate Beams and solution methods.

UNIT – V

Objective: After studying this unit student will know how a cylinder fails, what kind of stresses induced in cylinders subjected to internal, external pressures and also problem solving techniques.


UNIT – VI

Objective: After studying this unit student will know shear stresses induced in circular shafts, discussing columns in stability point of view and columns with different end conditions.


COLUMNS:
Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler’s Formula, Rankine’s Formula,

Text Books:

1. Strength of materials /GH Ryder/ Mc Millan publishers India Ltd
2. Solid Mechanics, by Popov

References:

4. Strength of Materials by S.Timoshenko
Course Objectives:

To impart the knowledge of the thermodynamic laws and principles so as to enable the student to prepare an energy audit of any mechanical system that exchange heat and work with the surroundings.

UNIT – I

Objectives: The student should be able to understand the basic concepts like thermodynamic system, its boundary and related fundamental definitions. Distinction between point function and path function shall be made with respect to energy, work and Heat.


UNIT II

Objectives: To learn the first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems. To understand the concept of equality of temperature and the principle of operation of various temperature measuring devices. To learn the applications of steady flow energy equation to the various mechanical components.


UNIT – III

Objectives: To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Should be able to analyse the concepts of Carnot cycle, entropy, availability and irreversibility. Should be able to understand the use of Maxwell’s relations and thermodynamic functions.

UNIT IV
Objectives: should understand the process of steam formation and its representation on property diagrams with various phase changes and should be able to calculate the quality of steam after its expansion in a steam turbine, with the help of standard steam tables and charts.

UNIT – V
Objectives: Should be able to use Psychrometric chart and calculate various psychrometric properties of air.

UNIT - VI
Objectives: To understand the concept of air standard cycles and should be able to calculate the efficiency and performance parameters of the systems that use these cycles.

Text Books :
1. Engineering Thermodynamics , PK Nag 4th Edn , TMH.

References :
1. Engineering Thermodynamics – Jones & Dugan PHI
2. Thermodynamics – J.P.Holman , McGrawHill
Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

UNIT-I
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:
Production and Cost Analysis:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III:
Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

UNIT – IV:
Types of Business Organization and Business Cycles:

UNIT – V:
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)
UNIT – VI:
**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**Course Outcome:**

*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.

*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

**TEXT BOOKS**


**References:**

2. V. Maheswari: Managerial Economics, Sultan Chand.2014
Objective: The students completing this course are expected to understand the properties of fluids, its kinematic and dynamic behavior through various laws of fluids like continuity, Euler’s, Bernoulli’s equations, energy and momentum equations. Further, the student shall be able to understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.

UNIT I
Objective: After studying this unit student will know the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.

UNIT II
Objective: In this unit student will be exposed to the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.
Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow, circulation and vorticity, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow.
Fluid dynamics: surface and body forces –Euler’s and Bernoulli’s equations for flow along a stream line, momentum equation and its applications, force on pipe bend.
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 III
Objective: At the end of this unit student will be aware of the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.
Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.
Dimensional Analysis: Similitude and modelling – Dimensionless numbers

UNIT IV
Objective: In this unit student will know the hydrodynamic forces acting on vanes and their performance evaluation.
Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.
UNIT V

Objective: At the end of this unit student will be aware of the importance, function and performance of hydro machinery.

**Centrifugal pumps:** classification, working, work done – manometric head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH.

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

UNIT VI

Objective: After studying this unit student will be in a position to evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.

**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.


Text Books:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.
3. Fluid Mechanics and Hydraulic Machines/ RK Bansal/Laxmi Publications (P) Ltd.

Reference Books:

2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
5. Fluid Mechanics and Hydraulic Machines by Domkundwar & Domkundwar, Dhanpatrai & Co.
Course Objective: To enhance the student’s knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modelling.

UNIT-I:
Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection.

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

UNIT-II:
The knowledge of sections of solids and development of surfaces is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection.

SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their parts.

UNIT-III:
The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic. A perspective view provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Prism Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

In part B computer aided drafting is introduced.

UNIT IV:
The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.

INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling.

UNIT V:
By going through this topic the student will be able to understand the paper-space environment thoroughly.

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.
UNIT VI:
The objective is to make the students create geometrical model of simple solids and machine parts and display the same as an Isometric, Orthographic or Perspective projection.


Text Books:

References:
1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age
5. Engineering Drawing – RK Dhawan, S Chand
11. Engineering Drawing with Auto CAD/ James D Bethune/Pearson Publications

End Semester examination shall be conducted for Four hours with the following pattern:

a) Two hours- Conventional drawing
b) Two hours – Computer Aided Drawing
Section A: Electrical Engineering:

Learning Objectives:

- To predetermine the efficiency of dc shunt machine using Swinburne’s test.
- To predetermine the efficiency and regulation of 1-phase transformer with O.C and S.C tests.
- To obtain performance characteristics of DC shunt motor & 3-phase induction motor.
- To find out regulation of an alternator with synchronous impedance method.
- To control speed of dc shunt motor using speed control methods.
- To find out the characteristics of PN junction diode & transistor
- To determine the ripple factor of half wave & full wave rectifiers.

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne’s test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method

Section B: Electronics Engineering.

The following experiments are required to be conducted as compulsory experiments:

1. PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)
2. Transistor CE characteristics (Input and output)
3. Half wave rectifier with and with out filters.
4. Full wave rectifier with and with out filters.
5. CE amplifiers.
6. OP- Amp applications (inverting, non inverting, integrator and differentiator)
Learning Outcomes:

- Able to find out the efficiency of dc shunt machine without actual loading of the machine.
- Able to estimate the efficiency and regulation for different load conditions and power factors of single phase transformer with OC and SC test.
- Able to analyse the performance characteristics and to determine efficiency of DC shunt motor & 3-phase induction motor.
- Able to pre-determine the regulation of an alternator by synchronous impedance method.
- Able to control the speed of dc shunt motor using speed control methods.
- Able to find out the characteristics of PN junction diode & transistor
- Able to determine the ripple factor of half wave & full wave rectifiers.
Course Objective: To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.

NOTE: Any 6 experiments from each section A and B.

(A) MECHANICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on
   a) Simple supported
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinells hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

(B) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.
Objective: The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

UNIT – I
Objective: The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.


UNIT – II
Objective: The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism.


UNIT – III
Objective: The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous centre of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.
UNIT – IV
Objective: The objective of this unit is to make student understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.

CAMS

UNIT – V
Objective: The objective of this unit is to make student understand gears, power transmission through different types of gears including gear profiles and its efficiency.

GEARS
Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VI
Objective: The objective of this unit is to make student understand various power transmission mechanisms and methodologies and working principles. Students are exposed to merits and demerits of each drive.

Power Transmissions: Introduction, Belt and rope drives, selection of belt drive – types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains – length, angular speed ratio, classification of chains.

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

Text Books:

1. Mechanism and Machine Theory by Ashok G. Ambekar, PHI Publishers
2. Theory of Machines – S. S Rattan- TMH

References:

1. Theory of Machines Sadhu Singh, Pearsons Edn
3. Theory of Machines by Thomas Bevan/ CBS
UNIT – I

Objectives: To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation.


UNIT – II

Objectives: To familiarize the student with the various engine systems along with their function and necessity.


UNIT – III

Objectives: To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.


UNIT – IV

Objectives: To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.

UNIT – V

Objectives: To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.

COMPRESSORS – Classification – positive displacement and rotodynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, multi stage compression, undercooling, saving of work, minimum work condition for two stage compression.

UNIT VI

Objectives: To make students learn mechanical details, and to calculate power and efficiency of rotary compressors


Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

Text Books:

1. I.C. Engines / V. Ganesan- TMH
2. Heat engines, Vasandani & Kumar publications Thermal

References:

1. Thermal Engineering / RK Rajput/ Lakshmi Publications
6. Thermal Engineering / PL Ballaney, Khanna Publishers
Course Objective:

To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, bulk forming, sheet metal forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.

UNIT – I

CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT – III

Welding: Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, Manual metal arc welding, Submerged arc welding, Inert Gas welding- TIG & MIG welding.

UNIT – IV


Heat affected zones in welding; pre & post heating, Weldability of metals, welding defects – causes and remedies – destructive and non destructive testing of welds, Design of welded joints.

UNIT – V

Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing. Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

Introduction to powder metallurgy – compaction and sintering, advantages and applications
**UNIT – VI**

Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools.

High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection moulding.

**Text Books:**


**References :**

2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology- R.K. Jain- Khanna
4. Production Technology-P C Sharma-S. Chand
5. Manufacturing Processes- H.S. Shaun- Pearson

**Course out comes:** At the end of the course the student shall be able to:

1. Design patterns, Gating, runner and riser systems
2. Select a suitable casting process based on the component
3. Learn various arc and solid state welding processes and select a suitable process based on the application and requirements
4. Understand various bulk deformation processes
5. Understand various sheet metal forming and processing of plastics
Course Objectives:

1. The student shall gain appreciation and understanding of the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturing activity.
2. Selection of proper materials to different machine elements based on their physical and mechanical properties.
3. Learn and understanding of the different types of failure modes and criteria.
4. Procedure for the different machine elements such as fasteners, shafts, couplings, keys, axially loaded joints etc.

UNIT – I

INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits –BIS codes of steels.


UNIT – II


UNIT – III

Riveted and welded joints – design of joints with initial stresses – eccentric loading.

Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, different seals.

UNIT – IV

KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints- knuckle joints.

SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).

UNIT – V

SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).
UNIT – VI

MECHANICAL SPRINGS:

Stresses and deflections of helical springs – extension -compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.

Note: Design data book is NOT Permitted for examination

Text Books:

3. Design data book of Engineers-

References:

1. Design of Machine Elements / V.M. Faires/McMillan
5. Design of machine elements-Spotts/Pearson Publications

Course outcomes:

Upon successful completion of this course student should be able to:

1. Apply the design procedure to engineering problems, including the consideration of technical and manufacturing constraints.
2. Select suitable materials and significance of tolerances and fits in critical design applications.
3. Utilize design data hand book and design the elements for strength, stiffness and fatigue.
4. Identify the loads, the machine members subjected and calculate static and dynamic stresses to ensure safe design.
II Year - II Semester

MACHINE DRAWING

Course Objective: The student will acquire knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details - common abbreviations & their liberal usage

e) Types of Drawings – working drawings for machine parts.

PART-A

I. Drawing of Machine Elements and simple parts

Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cotter joints and knuckle joint.

c) Riveted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.
PART-B

II. Assembly Drawings:
Objective: The student will be able to draw the assembly from the individual part drawing.

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – Gear pump, Fuel pump Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves: spring loaded safety valve, feed check valve and air cock, Control valves

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts. End semester examination for 70 Marks, Part A- 20 Marks (Answer two questions out of Three), Part B- 50 Marks (Assembly Drawing).

Text Books:


References:

1. Machine Drawing – P.S.Gill,
Course Objectives:

1. To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering.
2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
4. To enable students to understand their role as engineers and their impact to society at the national and global context.

UNIT – I
INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement, concepts of management, importance, functions of management, scientific management, Taylor’s principles, theory X and theory Y, Fayol’s principles of management.

UNIT – II
PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

UNIT – III
OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

UNIT – IV
STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – $\bar{X}$ and $R$ – charts $\bar{X}$ AND $S$ charts and their applications, numerical examples.

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts.

UNIT – V
RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.
UNIT - VI
VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

PROJECT MANAGEMENT: PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

2. Industrial Engineering and Production Management/Martand Telsang/S.Chand & Company Ltd. New Delhi

Reference Books:

1. Industrial Management / Bhattacharya DK/Vikas publishers
5. Statistical Quality Control /Gupta/Khanna Publishers
6. Industrial Engineering and Management /NVS Raju/Cengage Publishers

Course outcome:

Upon successful completion of this course you should be able to:

1. Design and conduct experiments, analyse, interpret data and synthesize valid conclusions
2. Design a system, component, or process, and synthesize solutions to achieve desired needs
3. Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints
4. Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
Course Objective: To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

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.
Course Objective: To impart hands-on practical exposure on manufacturing processes and equipment.

Minimum of 12 Exercises need to be performed

I. METAL CASTING:
1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - for strength and permeability
3. Mould preparation, Melting and Casting

II WELDING:
1. Gas welding
2. Gas cutting
3. Manual metal arc welding - Lap & Butt Joints
4. TIG/MIG Welding
5. Resistance Spot Welding
6. Brazing and soldering

III METAL FORMING AND POWDER METALLURGY:
1. Blanking & Piercing operations and study of simple, compound and progressive dies.
2. Deep drawing and extrusion operations.
3. Bending and other operations
4. Basic powder compaction and sintering

IV PROCESSING OF PLASTICS
1. Injection Moulding
2. Blow Moulding
Course Objectives:

1. To equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems, vibrations.
2. Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of vibrations and its significance on engineering design.
4. Develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces and moments.

UNIT – I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms, (Demonstration of models in video show).

UNIT – II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.


UNIT – III

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-IV

GOVERNERS: Watt, porter and proell governors, spring loaded governors – Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of “V” multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.
UNIT – VI

VIBRATIONS: Free Vibration of spring mass system –Natural frequency-types of damping – damped free vibration. Simple problems on forced damped vibration, vibration isolation and transmissibility transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly’s methods, Raleigh’s method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

Text Books :


References :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shigley / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers

Course outcomes:

Upon successful completion of this course the student should be able to:

1. Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
2. Compute frictional losses, torque transmission of mechanical systems.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
4. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
5. Understand balancing of reciprocating and rotary masses.
Course objectives:

1. The course provides students with fundamental knowledge and principles in material removal processes.

2. In this course, the students apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, and drill presses, Computer Numerical Control etc.

3. To demonstrate the fundamentals of machining processes and machine tools.

4. To develop knowledge and importance of metal cutting parameters.

5. To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.

6. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes.

UNIT – I

FUNDAMENTAL OF MACHINING:

Elementary treatment of metal cutting theory – element of cutting process – geometry of single point cutting tool, tool angles, chip formation and types of chips – built up edge and its effects, chip breakers, mechanics of orthogonal cutting – Merchant’s force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, tool wear, machinability, economics of machining, coolants, tool materials and properties.

UNIT – II

LATHE MACHINES:


UNIT – III

SHAPING, SLOTTING AND PLANNING MACHINES: Principles of working – principal parts – specifications, operations performed, machining time calculations.


UNIT – IV

UNIT –V

FINISHING PROCESSES: Theory of grinding – classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT - VI

JIGS & FIXTURES: Principles of design of jigs and fixtures and uses, classification of jigs & fixtures, principles of location and clamping, types of clamping & work holding devices, typical examples of jigs and fixtures.

CNC MACHINE TOOLS: CNC Machines, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines.

Text Books:

References:
1. Metal cutting and machine tools /Geoffrey Boothroyd, Winston A.Knight/ Taylor & Francis
4. Technology of machine tools/S.F.Krar, A.R. Gill, Peter SMID/ TMH

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1) Apply cutting mechanics to metal machining based on cutting force and power consumption.
2) Operate lathe, milling machines, drill press, grinding machines, etc.
3) Select cutting tool materials and tool geometries for different metals.
4) Select appropriate machining processes and conditions for different metals.
5) Learn machining economics.
6) Design jigs and Fixtures for simple parts.
7) Learn principles of CNC Machines
Course Objectives:

• This course gives the insight of slider and roller bearings and the life prediction.
• Learn to design I.C engine parts
• Design the mechanical systems for power transmission elements such as gears, belts, ropes, chains, keys and levers

UNIT – I


UNIT – II

ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts.

Pistons, forces acting on piston – construction design and proportions of piston, cylinder, cylinder liners,

UNIT – III

Design of curved beams: introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section, design of crane hooks, c –clamps.

UNIT – IV

POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by belt and rope drives , transmission efficiencies, belts – flat and v types – ropes - pulleys for belt and rope drives, materials, chain drives

DESIGN OF POWER SCREWS: Design of screw, square ACME, buttress screws, design of nut, compound screw, differential screw, ball screw - possible failures.

UNIT – V


UNIT – VI


Wire Ropes: Construction, Designation, Stresses in wire ropes, rope sheaves and drums.
Note: Design data book is permitted for examination

Text Books:


References:

3. Design of machine elements- spots/Pearson Publications

Course outcomes: At the end of the course

1. The student will able to select the suitable bearing based on the application of the loads and predict the life of the bearing
2. Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
3. Design of IC Engines parts.
Course Objectives:
To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and business applications and to use the various techniques of Operations Research in solving such problems.

UNIT – I
Development – definition– characteristics and phases – types of operation research models – applications.


UNIT – II

**SEQUENCING** – Introduction – flow –shop sequencing – n jobs through two machines – n jobs through three machines – job shop sequencing – two jobs through ‘m’ machines.

UNIT – III
**REPLACEMENT:** Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT – IV
**THEORY OF GAMES:** Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

**WAITING LINES:** Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals.

UNIT – V
**INVENTORY**: Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost. ABC & VED Analysis.
UNIT – VI


TEXT BOOKS:

1. Operations Research-An Introduction/Hamdy A Taha/Pearson publishers

REFERENCES:

1. Introduction to O.R/Hiller & Libermann/TMH

Course Outcomes:

After completion of the course, the student will be able to:

To solve the LP and DP problems

To solve the Transportation, assignment, game, inventory, replacement, sequencing, queuing problems.
Course objectives:

This course is intended to provide basic knowledge of components being used in steam and gas power plant cycles and to analyse the energy transfers and transformations in these components including individual performance evaluation.

UNIT – I


UNIT II


UNIT – III

STEAM NOZZLES: Function of a nozzle – applications - types, flow through nozzles, thermodynamic analysis – assumptions -velocity of fluid at nozzle exit-Ideal and actual expansion in a nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

STEAM TURBINES: Classification – impulse turbine; mechanical details – velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-laval turbine - methods to reduce rotor speed -velocity compounding, pressure compounding and velocity & pressure compounding, velocity and pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine, condition for maximum efficiency.

UNIT IV


UNIT – V

UNIT – VI

JET PROPULSION: Principle of operation – classification of jet propulsive engines – working principles with schematic diagrams and representation on t-s diagram - thrust, thrust power and propulsion efficiency – turbo jet engines – needs and demands met by turbo jet – schematic diagram, thermodynamic cycle, performance evaluation, thrust augmentation – methods.


Text Books:
1. Thermodynamics and Heat Engines/R.Yadav, Volume -II /Central Publishing House
2. Gas Turbines /V.Ganesan /TMH
3. Heat Engineering /V.P Vasandani and D.S Kumar/Metropolitan Book Company, New Delhi

References:
2. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
6. Thermal Engineering / RK Rajput/ Lakshmi Publications

Course outcomes:

After undergoing this course the student is expected to understand the working of steam and gas power plant cycles and also should be able to analyze and evaluate the performance of individual components. The student also should be in a position to understand basic principles of Jet propulsion and rocket engineering.
III Year - I Semester

L T P C
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THEORY OF MACHINES LAB

1. To determine whirling speed of shaft theoretically and experimentally.
2. To determine the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation.
3. To analyse the motion of a motorized gyroscope when the couple is applied along its spin axis.
4. To determine the frequency of undamped free vibration of an equivalent spring mass system.
5. To determine the frequency of damped force vibration of a spring mass system.
6. To study the static and dynamic balancing using rigid blocks.
7. To find the moment of inertia of a flywheel.
8. To plot follower displacement vs cam rotation for various Cam Follower systems.
9. To plot slider displacement, velocity and acceleration against crank rotation for single slider crank mechanism/Four bar mechanism.
10. To find coefficient of friction between belt and pulley.
11. To study simple and compound screw jack and determine the mechanical advantage, velocity ratio and efficiency.
12. To study various types of gears- Spur, Helical, Worm and Bevel Gears.
Course objectives:
The students are required to understand the parts of various machine tools and operate them. They are required to understand the different shapes of products that can be produced on these machine tools.

1. Introduction of general purpose machines - lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.

2. Step turning and taper turning on lathe machine

3. Thread cutting and knurling on lathe machine.

4. Drilling and tapping

5. Shaping and planning

6. Slotting

7. Milling

8. Cylindrical surface grinding


Course outcome:
The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.
Course objective: To provide hands on experience in operating various types of internal combustion engines and understand their functioning and performance.

1. I.C. Engines valve / port timing diagrams.
2. Testing of Fuels – Viscosity, flash point/fire point, carbon residue, calorific value.
3. I.C. Engines performance test and Exhaust emission measurements (4-stroke diesel engine)
4. I.C. Engines performance test and Exhaust emission measurements (2-stroke petrol engine)
5. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine.
6. Determination of FP by retardation and motoring test on IC engine.
7. I.C. Engines heat balance at different loads and show the heat distribution curve.
10. Performance test on reciprocating air compressor unit.
11. Dis-assembly / assembly of different parts of two wheelers. 3 wheelers & 4 wheelers. Tractor & Heavy duty engines covering 2-stroke and 4 stroke, SI and CI engines.
12. Study of boilers, mountings and accessories.
Objectives:

*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.

*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

UNIT I: Introduction to Intellectual Property Rights (IPR)


UNIT II: Copyrights and Neighbouring Rights


UNIT III: Patents


UNIT IV: Trademarks


UNIT V: Trade Secrets

UNIT VI: Cyber Law and Cyber Crime


- Relevant Cases Shall be dealt where ever necessary.

Outcome:

* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

References:

6. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.
Course objectives:

The students will learn

1. Inspection of engineering parts with various precision instruments
2. Design of part, tolerances and fits
3. Principles of measuring instruments and gauges and their uses
4. Evaluation and inspection of surface roughness
5. Inspection of spur gear and thread elements
6. Machine tool testing to evaluate machine tool quality

UNIT-I

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits - Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, deterministic & statistical tolerances, selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

UNIT-II

LINEAR MEASUREMENT: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.
MEASUREMENT OF ANGLES AND TAPERS:
Different methods – bevel protractor, angle slip gauges- angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to measure angles and tapers.
LIMIT GAUGES:
Taylor’s principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-III

OPTICAL MEASURING INSTRUMENTS: Tools maker’s microscope and uses - autocollimators, optical projector, optical flats and their uses.
INTERFEROMETRY:
Interference of light, Michelson’s interferometer, NPL flatness interferometer, and NPL gauge interferometer.

UNIT-IV

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness – Numerical assessment of surface finish-CLA, Rt., R.M.S. Rz, R10 values, Method of measurement of surface finish – Profilograph, Talysurf, ISI symbols for indication of surface finish.
COMPARATORS: Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.
UNIT – V

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.

SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

UNIT – VI

FLATNESS MEASUREMENT:
Measurement of flatness of surfaces- instruments used- straight edges- surface plates – auto collimator.

MACHINE TOOL ALIGNMENT TESTS: Principles of machine tool alignment testing on lathe, drilling and milling machines.

Text Books:
1. Dimensional Metrology/Connie Dotson/Cengage Learning

References:
3. Precision Engineering in Manufacturing / R.L.Murthy / New Age
5. Engineering Metrology / KL Narayana/Scitech publishers

Course outcomes:
Students will be able to design tolerances and fits for selected product quality. They can choose appropriate method and instruments for inspection of various gear elements and thread elements. They can understand the standards of length, angles, they can understand the evaluation of surface finish and measure the parts with various comparators. The quality of the machine tool with alignment test can also be evaluated by them.
Course Objectives:

The course focuses on imparting the principles of measurement which includes the working mechanism of various sensors and devices, that are in use to measure the important physical variables of various mechatronic systems.

UNIT – I


Measurement of Displacement: Theory and construction of various transducers to measure displacement – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II


MEASUREMENT OF PRESSURE: Units – classification – different principles used. manometers, piston, bourdon pressure gauges, bellows – diaphragm gauges. low pressure measurement – thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge.

UNIT – III

MEASUREMENT OF LEVEL : Direct method – indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, ultrasonic, turbine flow meter, hot – wire anemometer, laser Doppler anemometer (LDA).

MEASUREMENT OF SPEED : Mechanical tachometers – electrical tachometers – stroboscope, noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments – principles of seismic instruments – Vibrometer and accelerometer using this principle.

UNIT – IV

UNIT – V

MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, absorption psychrometer, dew point meter.

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, torsion meters, dynamometers.

UNIT – VI


Text Books:
1. Measurement Systems: Applications & design / D.S Kumar/
2. Mechanical Measurements / BeckWith, Marangoni,Linehard, Pearson

References:
1. Measurement systems: Application and design/Doeblin Earnest. O. Adaptation/ TMH
2. Experimental Methods for Engineers / J.P.Holman/McGraw Hill
4. Instrumentation, measurement & analysis / B.C.Nakra & K.K.Choudhary/TMH

Course outcomes:

After undergoing the course the student can select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.
Course objectives:

The course is to understand the basic cycles of various refrigerating systems, their performance evaluation along with details of system components and refrigerant properties. The course is also aimed at imparting knowledge of psychrometric properties, processes which are used in air-conditioning systems for comfort and industrial applications.

UNIT – I

INTRODUCTION TO REFRIGERATION: Necessity and applications – unit of refrigeration and C.O.P. – Mechanical refrigeration – types of ideal cycles of refrigeration, air refrigeration: bell Coleman cycle - open and dense air systems – refrigeration systems used in air crafts and problems.

UNIT – II


UNIT III

REFRIGERANTS – Desirable properties – classification - refrigerants used – nomenclature – ozone depletion – global warming


UNIT IV

VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of NH₃ – water system and Li Br –water ( Two shell & Four shell) System, principle of operation three fluid absorption system, salient features.

STEAM JET REFRIGERATION SYSTEM: Working Principle and basic components. principle and operation of (i) thermoelectric refrigerator (ii) vortex tube.

UNIT – V

INTRODUCTION TO AIR CONDITIONING: Psychometric properties & processes – characterization of sensible and latent heat loads — need for ventilation, consideration of infiltration – load concepts of RSHF, GSHF- problems, concept of ESHF and ADP temperature.

Requirements of human comfort and concept of effective temperature- comfort chart –comfort air conditioning – requirements of industrial air conditioning, air conditioning load calculations.
UNIT – VI

AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. heat pump – heat sources – different heat pump circuits.

Text Books:
1. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai
2. Refrigeration and Air Conditioning / CP Arora / TMH.

References:
1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration /Dossat / Pearson Education.
3. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH

Course outcomes: At the end of the course the students should be able to:

After undergoing the course the student should be in a position to analyze various refrigerating cycles and evaluate their performance. The student also should be able to perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial air-conditioning.
Course Objectives:

This course is intended to impart knowledge of principles of heat transfer and analyze the heat exchange process in various modes for the evaluation of rate of heat transfer and the temperature distribution in different configurations.

UNIT – I

INTRODUCTION: Modes and mechanisms of heat transfer – basic laws of heat transfer – General discussion about applications of heat transfer.

CONDUCTION HEAT TRANSFER: Fourier rate equation – general heat conduction equation in cartesian, cylindrical and spherical coordinates. Steady, unsteady and periodic heat transfer – initial and boundary conditions.


UNIT – II

extended surface (fins) heat Transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature.

ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – significance of biot and fourier numbers - chart solutions of transient conduction systems

UNIT – III

CONVECTIVE HEAT TRANSFER: Classification of convective heat transfer – dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem for forced and free convection, application for developing semi – empirical non- dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.

UNIT –IV

FORCED CONVECTION

EXTERNAL FLOWS: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer - flat plates and cylinders.

INTERNAL FLOWS: Concepts about hydrodynamic and thermal entry lengths – division of internal flow based on this – use of empirical relations for horizontal pipe flow and annulus flow.

FREE CONVECTION: Development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for vertical plates and pipes.
UNIT V

HEAT TRANSFER WITH PHASE CHANGE

BOILING: Pool boiling – regimes- calculations on nucleate boiling, critical heat flux and film boiling.

CONDENSATION: Film wise and drop wise condensation –Nusselt’s theory of condensation on a vertical plate - film condensation on vertical and horizontal cylinders using empirical correlations.

HEAT EXCHANGERS:

UNIT VI

RADIATION HEAT TRANSFER:

Text Books:
1. Heat Transfer /JP HOLMAN/TMH
2. Heat Transfer /P.K.Nag/ TMH

References:
1. Heat and Mass Transfer /Arora and Domkundwar/Dhanpatrai & sons

Course outcomes:
The student after undergoing this course is expected to know the principles of heat transfer and be able to apply to practical situations where in heat exchange takes place through various modes of heat transfer including phase change.
COURSE OBJECTIVE:
To develop and strengthen entrepreneurial quality and motivation in students. To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively.

UNIT I ENTREPRENEURIAL COMPETENCE

UNIT II ENTREPRENEURIAL ENVIRONMENT
Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services –

UNIT III INDUSTRIAL POLACIES
Central and State Government Industrial Policies and Regulations - International Business.

UNIT IV BUSINESS PLAN PREPARATION

UNIT V LAUNCHING OF SMALL BUSINESS

UNIT VI MANAGEMENT OF SMALL BUSINESS
Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business
Units- Effective Management of small Business.

COURSE OUTCOME:
Students will gain knowledge and skills needed to run a business.
Text Books:


References

DATA BASE MANAGEMENT SYSTEM
(OPEN ELECTIVE)

OBJECTIVES

• To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

UNIT-I: An Overview of Database Management, Introduction- What is Database System- What is Database- Why Database- Data Independence- Relation Systems and Others- Summary,


UNIT-II:

UNIT-III:
Queries, Constraints, Triggers, Overview, The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV:
SCHEMA REFINEMENT (NORMALIZATION) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V:
Transaction Management and Concurrency Control:
Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.

UNIT-VI:
Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing –Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization
OUTCOMES
- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL.
- Describe ER model and normalization for database design.
- Examine issues in data storage and query processing and can formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- Design and build database system for a given real world problem.

TEXT BOOKS:
1. Introduction to Database Systems, CJ Date, Pearson

REFERENCES BOOKS:
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
WASTE WATER MANAGEMENT
OPEN ELECTIVE

Learning Objectives:
• Outline planning and the design of waste water collection, conveyance and treatment systems for a community/town/city
• Provide knowledge of characterization of waste water generated in a community
• Impart understanding of treatment of sewage and the need for its treatment
• Summarize the appurtenance in sewage systems and their necessity
• Teach planning and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems
• Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers

UNIT-I:
Introduction to Sanitation-Systems of sanitation- relative merits and demerits - collection and conveyance of waste water - classification of sewerage systems-Estimation of sewage flow and storm water drainage-fluctuations-types of sewers- Hydraulics of sewers and storm drains-design of sewers- appurtenances in sewerage- cleaning and ventilation of sewers

UNIT-II:
Pumping of wastewater: Pumping stations-location- components- types of pumps and their suitability with regard to wastewaters.
House Plumbing: Systems of plumbing-sanitary fittings and other accessories-one pipe and two pipe systems- Design of building drainage

UNIT-III:
Sewage characteristics-Sampling and analysis of waste water-Physical, chemical and Biological examination-measurement of BOD & COD- BOD equations
Treatment of sewage: Primary treatment- Screens-grit chambers- grease traps- floatation-sedimentation-design of preliminary and primary treatment units.

UNIT-IV:
Secondary treatment: Aerobic and anaerobic treatment process -comparison.
Suspended growth process: Activated sludge process, principles, design and operational problems, modifications of Activated sludge processes, Oxidation ponds, Aerated Lagoons.
Attached Growth process: Trickling Filters-mechanism of impurities removal-classification-design-operation and maintenance problems. RBCs. Fluidized bed reactors

UNIT-V:

UNIT-VI:
Bio-solids (sludge) management: Characteristics- handling and treatment of sludge-thickening-anaerobic digestion of sludge
Disposal of sewage: Methods of disposal- disposal into water bodies- Oxygen sag Curve- Disposal into sea-disposal on land- sewage sickness

Outcomes:
By the end of successful completion of this course, the students will be able to:
• Plan and design the sewerage systems
• Characterization of sewage
• Select the appropriate appurtenances in the sewerage systems
• Select the suitable treatment flow for sewage treatment
• Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

Text Book:
3. Environmental Engineering by Howard S.Peavy , Donald R. Rowe, Teorge George Tchobanoglus-Mc-Graw-Hill Book Company, New Delhi, 1985
5. Industrial water & wastewater management by KVSG MuraliKrishna

Reference Book:
2. Sewage treatment and disposal by Dr.P.N.Modi & Sethi.
COMPUTER GRAPHICS

(OPEN ELECTIVE)

Course objectives:

This course allows the students to:

1. Understand the fundamental concepts and theory of computer graphics
2. Understand modeling, and interactive control of 3D computer graphics applications
3. The underlying parametric surface concepts be understood
4. Learn multimedia authoring tools.

UNIT-I

INTRODUCTION: Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT-II

OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.

2-D GEOMETRICAL TRANSFORMATIONS: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

UNIT -III

2-D VIEWING: The viewing pipe-line, viewing coordinate reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT -IV

3-D OBJECT REPRESENTATION: Spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms.

UNIT -V

3-D GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

UNIT -VI

COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification.
Text Books:

2. Computer Graphics Principles & practice-second edition in C/ Foley, VanDam, Feiner and Hughes/ Pearson Education

References:


Course outcomes:

Upon successful completion of the course, students will be able to:

1. Use the principles and commonly used paradigms and techniques of computer graphics
2. Write basic graphics application programs including animation
3. Design programs to display graphic images to given specifications
INDUSTRIAL ROBOTICS
(OPEN ELECTIVE)

Course Objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I

UNIT – II

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV
Differential transformation and manipulators, Jacobians – problems

UNIT V
General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

UNIT VI
ROBOT ACTUATORS AND FEED BACK COMPONENTS:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading - Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
Text Books:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

References:

Course outcomes:
Upon successful completion of this course you should be able to:

1. Identify various robot configuration and components,
2. Select appropriate actuators and sensors for a robot based on specific application
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains
4. Perform trajectory planning for a manipulator by avoiding obstacles.
GREEN ENGINEERING SYSTEMS

(OPEN ELECTIVE)

Course Objective:

The course aims to highlight the significance of alternative sources of energy, green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

UNIT-I
INTRODUCTION:
SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II
SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

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

UNIT – IV
ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.
UNIT-V
ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

UNIT – VI

Text Books:


References:
3. Non-Conventional Energy / Ashok V Desai /New Age International (P) Ltd
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa

Course outcome:
The student shall understand the principles and working of solar, wind, biomass, geo thermal, ocean energies and green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.
Objectives:

The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries.

1. COP of VCR System with Capillary and thermal expansion valve.
2. Determination of overall heat transfer co-efficient of a composite slab
3. Determination of heat transfer rate through a lagged pipe.
4. Determination of heat transfer rate through a concentric sphere
5. Determination of thermal conductivity of a metal rod.
6. Determination of efficiency of a pin-fin
7. Determination of heat transfer coefficient in natural and forced convection
10. Determination of Stefan Boltzman constant.

Outcomes:

The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers.
Course Objectives:

The Metrology and instrumentation Laboratory course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments. They also understand the machine tool alignment test. Instrumentation lab introduces the students with the theory and methods for conducting experimental work in the laboratory and calibration of various instruments for measuring pressure, temperature, displacement, speed, vibration etc.

Note: The students have to conduct at least 8 experiments from each lab

METROLOGY LAB

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier caliper for tooth thickness inspection and flange micrometer for checking the chordal thickness of spur gear.
5. Machine tool alignment test on drilling machine.
7. Angle and taper measurements with bevel protractor, Sine bar, rollers and balls.
8. Use of spirit level in finding the straightness of a bed and flatness of a surface.
9. Thread inspection with two wire/ three wire method & tool makers microscope.
10. Surface roughness measurement with roughness measuring instrument.

INSTRUMENTATION LAB

1. Calibration of pressure gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
5. Calibration of thermocouple.
7. Study and calibration of photo and magnetic speed pickups.
9. Study and calibration of a rotameter.
10. Study and use of a seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.
Course outcomes:

Metrology Lab

Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc)

Instrumentation Lab:

Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.
Course Pre-requisites:

- Basic courses of Fluid Mechanics, Heat transfer and Numerical methods are required as pre-requisites
- Knowledge of matrices, differentiation, integration and differential equations are expected

Course Objectives:

- Solving Problems of fluid mechanics and heat transfer by writing programs in C-language and MATLAB.
- Using ANSYS-FLUENT build a geometry, mesh that geometry, Perform CFD method on the mesh, perform the calculation, and post-process the results.
- Understanding the validation of the numerical result by comparison with known analytical results.
- Understanding the numerical result by invoking the physical principles of fluid mechanics and heat transfer.

PART-A

Writing Programs in C and MATLAB for the following:

1. Solution of Transcendental equations
2. Solution of Simultaneous algebraic equations
3. Numerical differentiation and Integration
4. Solution of Ordinary Differential Equation
5. Solution of a Tri-diagonal matrix using Thomas Algorithm.
6. Solution of Partial differential equations related to
   i) Elliptical Partial differential equations
   ii) Parabolic Partial differential equations
   iii) Hyperbolic Partial differential equations
7. Solution of 1-D and 2-D heat conduction with (Finite Difference method)
   i) Constant temperature boundary conditions
   ii) Constant heat flux boundary conditions
   iii) Convective boundary conditions
8. Solution of Incompressible Navier-Stokes equations (Finite difference and Finite Volume methods)
9. Solution of Inviscid incompressible fluid flows.(Finite difference and Finite Volume methods)

PART-B

Using ANSYS-FLUENT solve the following problems of heat transfer analysis

1. steady state conduction
2. Lumped heat transfer
3. Convective heat transfer – Internal flow (study both velocity and thermal boundary layers)
4. Convective heat transfer – External flow (study both velocity and thermal boundary layers)
5. Radiation heat transfer– Emissivity
Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:

UNIT II: Principles for Harmony:

UNIT III: Engineering Ethics and Social Experimentation:

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

UNIT V: Engineers’ Duties and Rights:
UNIT VI: Global Issues:


- Related Cases Shall be dealt where ever necessary.

Outcome:

*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
7. Professional Ethics and Human Values by A. Alavudeen, R. Kalil Rahman and M. Jayakumar - University Science Press.
9. Human Values And Professional Ethics by Jayashree Suresh and B. S. Raghavan, S.Chand Publications
Course Objective

The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the different components and devices of mechatronics systems.

UNIT-I

Mechatronics systems – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-III


UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.

UNIT -VI

Text Books:

1. MECATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition

References:

5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
7. Mechatronics – Principles and Application / Godfrey C. Onwubolu/Elsevier, Indian print

Course outcomes:

After completion of this course, the student shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.
Course Objectives:

The general objectives of the course are to enable the students to

1. Understand the basic fundamentals of computer aided design and manufacturing.
2. To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc
3. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication
4. To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control
5. To learn the overall configuration and elements of computer integrated manufacturing systems.

UNIT – I

Computers in industrial manufacturing, product cycle, CAD / CAM Hardware, basic structure, CPU, memory types, input devices, display devices, hard copy devices, storage devices.

COMPUTER GRAPHICS: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – II

GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

DRAFTING AND MODELING SYSTEMS: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modelling.

UNIT – III


UNIT – IV


UNIT – V

COMPUTER AIDED QUALITY CONTROL: Terminology used in quality control, use of computers in Quality control. Inspection methods- contact and noncontact types, computer aided testing, integration of CAQC with CAD/CAM.
UNIT – VI

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Types of manufacturing systems, machine tools and related equipment, material handling systems, material requirement planning, computer control systems, human labor in manufacturing systems, CIMS benefits.

Text Books:
1. CAD / CAM Principles and Applications/PN Rao / McGraw-Hill
2. Automation, Production systems & Computer integrated Manufacturing/ M.P. Groover/Pearson Education

References:
1. Mastering CAD / CAM / Ibrahim Zeid / McGraw-Hill
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
4. Product manufacturing and cost estimation using CAD/CAE/ Kuang Hua Chang/Elsevier Publishers

Course Outcome:
At the end of the course the students shall be able to:

1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix
2. Describe the use of GT and CAPP for the product development
3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.
Course Objectives:

1. To learn basic principles of finite element analysis procedure
2. To learn the theory and characteristics of finite elements that represent engineering structures
3. To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others
4. Learn to model complex geometry problems and solution techniques.

UNIT-I
Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.

UNIT – II
Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.

UNIT – III

UNIT – IV
Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems.

UNIT-V
Higher order and isoparametric elements: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

UNIT – VI
Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion. Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.
Text Books:


References:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho & Shah /Pearson publishers
4. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education
5. Finite Element Methods / Chen

Course outcomes:

Upon successful completion of this course you should be able to:

1. Understand the concepts behind variational methods and weighted residual methods in FEM
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
3. Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
4. Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.
Course Objectives:

The course is aimed at providing knowledge of power generation through different prime movers viz steam, ICGT, Hydro, nuclear and hybrid systems along with their economics and environmental considerations.

UNIT – I

Introduction to the sources of energy – resources and development of power in India.

STEAM POWER PLANT: Plant layout, working of different circuits, fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, ash handling systems. Combustion: properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection. corrosion and feed water treatment.

UNIT – II

INTERNAL COMBUSTION AND GAS TURBINE POWER PLANTS:

DIESEL POWER PLANT: Plant layout with auxiliaries – fuel supply system, air starting equipment, super charging.


UNIT – III


HYDRO PROJECTS AND PLANT: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – IV


TYPES OF REACTORS: Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding – radioactive waste disposal.

UNIT – V

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS: Introduction, advantages of combined working, load division between power stations, storage type hydro-electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydro-electric and gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O₂ and CO₂ measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.
UNIT – VI

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

Text Books:
1. A course in Power Plant Engineering /Arora and Domkundwar/Dhanpatrai & Co.

References:
3. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers

Course outcomes:

After undergoing this course the student can understand various conventional methods of power generation and principle of operation and performance of respective prime movers along with their economics and their impact on environment.
Course Objectives:
The course aims at providing required numerical and software techniques for solving various engineering problems involving fluid flow.

UNIT-I
ELEMENARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton’s second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

UNIT – III
Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation. Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT – IV
Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modelling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT – V
Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modelling, conservative property, the upwind scheme.

UNIT – VI
FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.
Text Books:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar/Butter-worth Publishers

References:

1. Computational Fluid Flow and Heat Transfer/ Niyogi/Pearson Publications

Course Outcomes:

After undergoing the course the student shall be able to apply various numerical tools like finite volume, finite difference etc for solving the different fluid flow heat transfer problems.
CONDITION MONITORING
(ELECTIVE – I)

Course Objectives:

- This course is designed to introduce the benefits and opportunities of health Monitoring and covers a range of techniques
- The students will be exposed to a range of techniques from Vibration based methods, Thermography, Oil conditions, Debris and ultrasonic monitoring
- Using overall vibration, vibration limit zones, broadband vibration bandwidth, alert levels, typical severity guidelines, recording overall vibration, using overall vibration for fault finding, trending overall vibration.

UNIT-I

BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, basic parameters: displacement, velocity, acceleration, units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II

VIBRATION MEASUREMENTS AND ANALYSIS: Transducers and mounting methods, data acquisition using instrumentation recorders/data loggers, time domain signal analysis, orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

VIBRATION MEASUREMENT AND ANALYSIS: Use of phase; bode, polar and waterfall plots, constant percentage band width analysis (1/3 and 1/1 Octave analysis), envelope detection /spike energy analysis, cepstral analysis, advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-III

Fault Diagnosis, Interpreting vibration measurements for common machine faults, imbalance, misalignment, mechanical looseness, bearing and gearing faults, faults in induction motors, resonances, some case studies, static and dynamic balancing, international standards for vibration condition monitoring.

UNIT-IV

THERMOGRAPHY: The basics of infrared thermography, differences in equipment and specific wave length limitations, application of ir to: electrical inspection, mechanical inspection, energy conservation, how to take good thermal images, hands-on demonstrations focusing on proper camera settings and image interpretation, analysis of thermal images and report generation, study of thermography applications

UNIT-V

OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, monitoring condition of oil, lubricant analysis, physio – chemical properties, moisture, tan tbn, wear debris analysis, particle counting, spectroscopy, uses & limitations, ferrography wear particle analysis, concept of ferrography, principle particle classification, size, shape, composition, concentration, analysis procedure, sampling & analytical ferrography equipments, severity rating.
UNIT-VI

ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic monitoring (leak, crack and thickness) basics of ultrasonic monitoring, ultrasonic theory, test taking philosophy, ultrasonic theory, mathematics of ultrasound, equipment and transducers, inspection parameters and calibration, immersion theory, equipment quality control, flaw origins and inspection methods, UT Procedure familiarization, and study recommendations, application of ultrasound to: air leaks, steam trap testing, bearing lubrication, electrical inspection, case studies.

Text Books:


References:

3. The Vibration Monitoring Handbook/Charles W Reeves/Coxmoor publishing company

Course outcomes:

- Gaining invaluable insights into the benefits of Condition Monitoring
- Understanding the reasons for selecting particular maintenance strategies
- Understanding effective methodologies for implementing Condition Monitoring Techniques
- Identifying the optimum maintenance strategy for different types of equipment
- Gaining practical approaches to minimize the risk of plant and machinery breakdowns
- Awareness of International Standards covering asset management
ADDITIVE MANUFACTURING

(ELECTIVE – I)

Course Objectives:

The course aims at the importance of Additive Manufacturing, classifications, models, specifications of various Additive Manufacturing Techniques. To learn the different tools, soft-wares required and the applications of Additive Manufacturing.

UNIT – I

INTRODUCTION: Prototyping fundamentals, historical development, fundamentals of rapid prototyping, advantages and limitations of rapid prototyping, commonly used terms, classification of RP process.


UNIT-II

SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated object manufacturing (LOM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modelling (FDM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT – III

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): models and specifications, process, working principle, applications, advantages and disadvantages, case studies. three dimensional printing (3DP): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-IV

RAPID TOOLING: Introduction to rapid tooling (RT), conventional tooling Vs RT, Need for RT. rapid tooling classification: indirect rapid tooling methods: spray metal deposition, RTV epoxy tools, Ceramic tools, investment casting, spin casting, die casting, sand casting, 3D Keltool process. Direct rapid tooling: direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

UNIT – V

RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, Newly Proposed Formats.

RAPID PROTOTYPING SOFTWARE’S: Features of various RP software’s like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.
UNIT –VI

RP APPLICATIONS: Application in engineering, analysis and planning, aerospace industry, automotive industry, jewelry industry, coin industry, GIS application, arts and architecture. RP medical and bioengineering applications: planning and simulation of complex surgery, customized implants & prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bimolecular.

Text Books:


References:

1. Rapid Manufacturing / D.T. Pham and S.S. Dimov/Springer
3. Rapid Prototyping & Manufacturing / Paul F.Jacobs/ASME Press
4. Rapid Prototyping / Chua & Liou

Course Outcomes:

The student shall be able to identify the use of Rapid Prototyping Techniques in the manufacturing of complex components that are otherwise very difficult to manufacture.
Course Objectives

The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behaviour, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

UNIT-I


REINFORCEMENTS: Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.

UNIT-II

Polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

UNIT-III

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, hand layup, pultrusion, RTM.

UNIT-IV

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized Hooke’s law, reduction of Hooke’s law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

UNIT-V

FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials-classification-different systems-preparation-properties and applications of functionally graded materials.

SHAPE MEMORY ALLOYS: Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.

UNIT-VI

NANO MATERIALS: Introduction-properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (nano – structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.
Text Books:

1. Nano material /A.K. Bandyopadyay/New age Publishers
2. Material science and Technology: A comprehensive treatment/Robert W. Cahn./VCH

References:

Course Objectives:

1. Understand the design rules and considerations with reference to various manufacturing processes
2. To discuss capabilities and limitations of each manufacturing process in relation to part design and cost
3. To examine DFM principles including how the design affects manufacturing cost, lean manufacturing, six sigma, etc.

UNIT - I

Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production-creativity in design. Design for the life cycle total product life of consumer goods-design considerations.

UNIT – II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III

Metal casting: Appraisal of various casting processes, selection of casting process, general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT – IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT – VI

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.
Text Books:

1. Design for manufacture / John cobert / Adisson Wesley. 1995
2. Design for Manufacture / Boothroyd/CRC Press

Reference:

1. ASM Hand book Vol.20

Course outcomes:

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

1. Design components for machining
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints
4. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms
5. Design plastic components for machining and joining and selecting a proper processes for different joining cases
GAS DYNAMICS AND JET PROPULSION
(ELECTIVE – II)

Course objectives:
The purpose of this course is to provide the student with the knowledge of basic principles of gas dynamics and its importance in jet propulsion applications.

UNIT-I
Introduction to gas dynamics: control volume and system approaches acoustic waves and sonic velocity - mach number - classification of fluid flow based on mach number - mach cone-compressibility factor - general features of one dimensional flow of a compressible fluid - continuity and momentum equations for a control volume.

UNIT-II
Isentropic flow of an ideal gas: basic equation - stagnation enthalpy, temperature, pressure and density - stagnation, acoustic speed - critical speed of sound - dimensionless velocity-governing equations for isentropic flow of a perfect gas - critical flow area - stream thrust and impulse function.
Steady one dimensional isentropic flow with area change - effect of area change on flow parameters - choking - convergent nozzle - performance of a nozzle under decreasing back pressure - De laval nozzle - optimum area ratio effect of back pressure - nozzle discharge coefficients - nozzle efficiencies.

UNIT- III
Simple frictional flow: adiabatic flow with friction in a constant area duct-governing equations - Fanno line limiting conditions - effect of wall friction on flow properties in an Isothermal flow with friction in a constant area duct-governing equations - limiting conditions.
Steady one dimensional flow with heat transfer in constant area ducts - governing equations - Rayleigh line entropy change caused by heat transfer - conditions of maximum enthalpy and entropy.

UNIT- IV

UNIT- V
Propulsion: Air craft propulsion: - types of jet engines - energy flow through jet engines, thrust, thrust power and propulsive efficiency turbojet components-diffuser, compressor, combustion chamber, turbines, exhaust systems.

UNIT- VI
**Text Books:**
2. Fundamentals of compressible flow with aircraft and rocket propulsion/S. M. Yahya/New Age international Publishers

**References:**
1. Elements of gas dynamics / HW Liepman & A Roshko/Wiley
2. Aircraft & Missile propulsion /MJ Zucrow/Wiley

**Course outcomes:**
Up on successful completion of this course the student should be able to analyze the gas flow in different situations with and without friction, with and without heat transfer in particular jet propulsion and rocket engineering applications.
Course Objectives:

1. To impart the fundamental knowledge on using various analytical tools like ANSYS, FLUENT, etc., for Engineering Simulation
2. To know various fields of engineering where these tools can be effectively used to improve the output of a product.
3. To impart knowledge on how these tools are used in Industries by solving some real time problems using these tools.

1. **DRAFTING:** Development of part drawings for various components in the form of orthographic and isometric representation of dimensioning and tolerances scanning and plotting. Study of script, DXE and IGES files.
3. a). Determination of deflection and stresses in 2D and 3D trusses and beams.
   b). Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
   c). Determination of stresses in 3D and shell structures (at least one example in each case)
   e). Steady state heat transfer Analysis of plane and Axisymmetric components.
4. a). Study of various post processors used in NC Machines.
   c) Practice on CNC Sinutrain Turning
   d) Practice on CNC Sinutrain Milling
   e) CNC programming for turned components using FANUC Controller
   f) CNC programming for milled components using FANUC Controller
   g) Automated CNC Tool path & G-Code generation using Pro/E/MasterCAM

**Packages to be provided to cater to drafting, modeling & analysis from the following:**

CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

**Course outcomes:**

Upon successful completion of this course student should be able to:

1. The student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems.
2. Use of these tools for any engineering and real time applications
3. Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their Employment
Course Outcomes: At the end of the course, the student will be able to:

1. Measure load, displacement and temperature using analogue and digital sensors.
2. Develop PLC programs for control of traffic lights, water level, lifts and conveyor belts.
3. Simulate and analyse PID controllers for a physical system using MATLAB.

List of Experiments

1. DYNA 1750 Transducers Kit: -
   a. Characteristics of LVDT
   b. Principle & Characteristics of Strain Gauge
   c. Characteristics of Summing Amplifier
   d. Characteristics of Reflective Opto Transducer

2. PLC PROGRAMMING
   a. Ladder programming on Logic gates, Timers & counters
   b. Ladder Programming for digital & Analogy sensors
   c. Ladder programming for Traffic Light control, Water level control and Lift control Modules

3. AUTOMATION STUDIO software
   a. Introduction to Automation studio & its control
   b. Draw & Simulate the Hydraulic circuit for series & parallel cylinders connection

4. MATLAB Programming
   a. Sample programmes on Matlab
   b. Simulation and analysis of PID controller using SIMULINK
Course objectives:

This subject provides students with

1. An understanding of the concepts of production and service systems;
2. The ability to apply principles and techniques in the design, planning and control of these systems to optimise/make best use of resources in achieving their objectives.
3. Identify different strategies employed in manufacturing and service industries to plan production and control inventory.
4. Measure the effectiveness, identify likely areas for improvement, develop and implement improved planning and control methods for production systems.

UNIT – I

UNIT – II
Forecasting – importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitative methods.

UNIT – III

UNIT – IV

UNIT – V
Scheduling policies – techniques, standard scheduling methods.
Line Balancing, aggregate planning, chase planning, expediting, controlling aspects.

UNIT – VI
Dispatching – activities of dispatcher – dispatching procedure – follow up – definition – reason for existence of functions – types of follow up, applications of computer in production planning and control.

Text Books:
1. Elements of Production Planning and Control / Samuel Eilon/Universal Book Corp.

References:
1. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller/Prentice-Hall
2. Production Planning and Control/Mukhopadyay/PHI.
3. Production Control A Quantitative Approach / John E. Biegel/Prentice-Hall
4. Production Control / Franklin G Moore & Ronald Jablonski/ Mc-GrawHill
Course Objectives:
• The course aims in identifying the classification of unconventional machining processes.
• To understand the principle, mechanism of metal removal of various unconventional machining processes.
• To study the various process parameters and their effect on the component machined on various unconventional machining processes.
• To understand the applications of different processes.

UNIT – I

INTRODUCTION: Need for non-traditional machining methods-classification of modern machining processes – considerations in process selection, applications.

Ultrasonic machining – Elements of the process, mechanics of material removal, MRR process parameters, economic considerations, applications and limitations.

UNIT – II

ELECTRO – CHEMICAL MACHINING: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy, economic aspects of ECM – Simple problems for estimation of metal removal rate, fundamentals of chemical, machining, advantages and applications.

UNIT - III

THERMAL METAL REMOVAL PROCESSES: General principle and applications of Electric Discharge Machining, Electric Discharge Grinding and wire EDM – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, surface finish and machining accuracy, characteristics of spark eroded surface

UNIT – VI

Electron Beam Machining, Laser Beam Machining - Basic principle and theory, mechanics of material removal, process parameters, efficiency & accuracy, applications

UNIT-V

Plasma Machining: Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

UNIT – VI

Abrasive jet machining, Water jet machining and abrasive water jet machining: Basic principles, equipments, process variables, mechanics of material removal, MRR, application and limitations, agnetic abrasive finishing, abrasive flow finishing, Electrostream drilling, shaped tube electrolytic machining.
Text Books:


References:

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
3. Non Traditional Manufacturing Processes / Benedict /

Course outcomes:

After completion of course, the student shall understand the principle of working, mechanism of metal removal in the various unconventional machining process. The student is able to identify the process parameters, their effect and applications of different processes.
Course Objectives:

The course imparts the principles of automobile systems and provides the salient features of safety, emission and service of automobiles.

UNIT – I


UNIT – II

TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III

STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – IV

SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.

ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – V

ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introduction- engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.

Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.
UNIT – VI

ENGINE EMISSION CONTROL: Introduction – types of pollutants, mechanism of formation, concentration measurement, methods of controlling-engine modification, exhaust gas treatment-thermal and catalytic converters-use of alternative fuels for emission control – National and International pollution standards

ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston-connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.

Text Books:

2. Automobile Engineering / William Crouse/TMH Distributors

References:

2. Automotive Engineering / K Newton, W.Steeds & TK Garrett/SAE
4. Automobile Engineering / C Srinivasan/McGrawHill

Course Outcomes:

The student after undergoing the course, shall visualize the layout of an automobile and its systems like transmission, steering, suspension, braking, safety etc and should know the vehicle troubleshooting.
UNIT - I:


UNIT - II:


Double Pipe Heat Exchanger: Film Coefficient for fluids in annulus, fouling factors, calorific temperature, average fluid temperature, the calculation of double pipe exchanger, Double pipe exchangers in series-parallel arrangements.

UNIT - III:

Shell & Tube Heat Exchangers: Tube layouts for exchangers, baffle Heat exchangers, calculation of shell and tube heat exchangers – shell side film coefficients, Shell side equivalent diameter, the true temperature difference in a 1-2 heat exchanger, influence of approach temperature on correction factor, shell side pressure drop, tube side pressure drop, Analysis of performance of 1-2 heat exchanger, and design calculation of shell & tube heat exchangers. Flow arrangements for increased heat recovery, the calculations of 2-4 exchangers.

UNIT - IV:

Condensation of single vapors: Calculation of a horizontal condenser, vertical condenser, De-super heater condenser, vertical condenser – sub-cooler, horizontal condenser – subcooler, vertical reflux type condenser, condensation of steam.

UNIT – V:

Vaporizers, Evaporators and Reboilers: Vaporizing processes, forced circulation vaporizing exchangers, natural circulation vaporizing exchangers, calculations of a reboiler.

Extended Surfaces: Longitudinal fins, weighted fin efficiency curve, calculation of a double pipe fin efficiency curve, calculation of a double pipe finned exchanger, calculation of a longitudinal fin shell and tube exchanger.

UNIT - VI:

Direct Contact Heat Exchanger: Cooling towers, relation between wet bulb & dew point temperatures, the Lewis number, and classification of cooling towers, cooling tower internals and the roll of fill, Heat balance, heat transfer by simultaneous diffusion and convection. Analysis of cooling tower requirements, Design of cooling towers, Determination of the number of diffusion units, calculation of cooling tower performance.
Text Books:

2. Cooling Towers by J.D. Gurney
NON - DESTRUCTIVE EVALUATION
(ELECTIVE – III)

Course Objectives

- The students are to be exposed to the concepts of various NDE techniques using radiography, ultrasonics, liquid penetrates, magnetic patches and Eddy currents
- They will learn basic principles of these methods and will be able to select a testing process
- They will understand the advantages and disadvantages of these techniques.

UNIT – I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography

UNIT – II


UNIT – III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing,


UNIT – IV

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test

UNIT – V


UNIT – VI

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions
**Text Books:**

1. Non destructive test and evaluation of Materials/J Prasad, GCK Nair/TMH Publishers
2. Ultrasonic testing of materials/ H Krautkramer/Springer
3. Non destructive testing/Warren, J Mc Gonnagle / Godan and Breach Science publishers

**References:**

1. Ultrasonic inspection training for NDT/ E. A. Gingel/Prometheus Press,
2. ASTM Standards, Vol 3.01, Metals and alloys

**Course Outcomes**

1. Comprehensive, theory based understanding of the techniques and methods of non destructive testing
2. Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.
QUALITY AND RELIABILITY ENGINEERING

(ELECTIVE – III)

Course objectives:

1. The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product quality and reliability.

2. The objectives are to introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring

3. To understand techniques of modern reliability engineering tools.

UNIT-I
Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design, quality costs – quality improvement.

UNIT-II
Statistical process control \(\bar{X}, R, p, c\) charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination)

UNIT-III
Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plans.

UNIT-IV
Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types. online quality control – variable characteristics, attribute characteristics, parameter design.
Quality function deployment – house of quality, QFD matrix, total quality management concepts. quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-V
Reliability – Evaluation of design by tests - Hazard Models, Linear, Releigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.

UNIT-VI
Complex system, reliability, reliability of series, parallel & standby systems & complex systems & reliability prediction and system effectiveness.
Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.
Text Books:
1. Quality Engineering in Production Systems / G Taguchi /McGraw Hill
2. Reliability Engineering/ E.Bala Guruswamy/Tata McGraw Hill,

References:
2. Taguchi Techniques for Quality Engineering/ Philipposs/ McGraw Hill,
3. Reliability Engineering / LS Srinath / Affiliated East West Pvt. Ltd.,
6. Quality and Performance Excellence/ James R Evans/ Cengage learning
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