ACADEMIC REGULATIONS
COURSE STRUCTURE AND DETAILED SYLLABUS

FOR

MECHANICAL ENGINEERING

For B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2012-2013)
REGULATION : R12

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
(Autonomous)

Yenkapally, Moinabad Mandal, P.O.Himayath Nagar, R.R.Dist, Hyderabad-500 075
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J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS) 

Academic Regulations 2012 for B. Tech (Regular)  
(Effective for the students admitted into I year from the Academic Year 2012-2013 onwards) 

1. **Award of B.Tech. Degree**  
A student will be declared eligible for the award of the B. Tech. Degree if he fulfils the following academic regulations:  
   i. **Pursued a course of study for not less than four academic years and not more than eight academic years.**  
   ii. **Register for 200 credits and secure 200 credits**  

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

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

<table>
<thead>
<tr>
<th>Branch Code</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>02</td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td>03</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>04</td>
<td>Electronics and Communication Engineering</td>
</tr>
<tr>
<td>05</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>11</td>
<td>Bio-Medical Engineering</td>
</tr>
<tr>
<td>12</td>
<td>Information Technology</td>
</tr>
<tr>
<td>25</td>
<td>Mining Engineering</td>
</tr>
</tbody>
</table>

and any other course as approved by the authorities of the JBIET from time to time.  

4. **Credits**  

<table>
<thead>
<tr>
<th>I Year</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Periods / Week</td>
</tr>
<tr>
<td>Theory</td>
<td>03 02</td>
</tr>
<tr>
<td>Practical</td>
<td>03 04</td>
</tr>
<tr>
<td>Drawing</td>
<td>02T/03D</td>
</tr>
<tr>
<td>Mini Project</td>
<td>-- --</td>
</tr>
<tr>
<td>Comprehensive Viva Voce</td>
<td>-- --</td>
</tr>
<tr>
<td>Seminar</td>
<td>-- --</td>
</tr>
<tr>
<td>Project</td>
<td>-- --</td>
</tr>
</tbody>
</table>
5. Distribution and Weightage of Marks

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

ii. For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

iii. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for subjective paper) and 75 marks for end examination. There shall be two internal tests in a Semester.

For theory subjects, the distribution shall be 25 marks for internal evaluation (Midterm exams (20 marks) + Assignment (5 marks)) and 75 marks for end examination. There shall be altogether four assignments (Each assignment consisting of 6 questions from every two units of syllabus) set by the teacher from the whole syllabus of the subject.

The pattern of question paper shall consist of two parts namely Part-A and Part-B out of which the candidate has to answer Part-A compulsorily and from Part-B, the candidate has to answer three questions out of five questions given. The Part-A i.e. question no.1 consists of sub questions, which are based on fundamentals and concept testing nature. These questions may of the following type:

a. Short answer questions for which answer is two to three sentences
b. Multiple choice questions
c. Fill in the blanks
d. True/False type

Any sub question may carry a maximum of 1 or 2 marks. Altogether candidate has to answer 4 questions out of 6 questions but question no.1 of Part-A is compulsory. The time allocated for the mid term examination is 2 hours. There shall be 2 Mid Term Examinations (1st Mid shall be from 1-4 Units and 2nd Mid shall be from 5-8 Units).

The Internal Evaluation is for 25 marks (20 for Mid term Examination and 5 Marks for Assignment), the average of these two shall be considered as the final marks for Internal Evaluation secured by the candidate.

However, for **first year**, there shall be 3 mid term examinations (Each for 20 Marks) and 3 Assignments (Each for 5 Marks), [1st mid shall be from 1-2 units, 2nd mid from 3-5 units and 3rd mid shall be from 6-8 units]. There shall be altogether six assignments (Each assignment consisting of 6 questions from every unit of syllabus) set by the teacher from the whole syllabus of the subject.

The Internal Evaluation is for 25 marks (20 for Mid term Examination and 5 Marks for Assignment), the average of these three shall be considered as the final marks for Internal Evaluation secured by the candidate.

The question paper shall contain 6 questions, 1 in Part-A and 5 in Part-B. The candidate shall have to answer Part-A compulsorily and shall have to answer any three questions from...
remaining five questions of Part-B. The Part-A i.e. question no.1 consists of sub questions, which are based on fundamentals and concept testing nature. These questions may of the following type:

a. Short answer questions for which answer is two to three sentences
b. Multiple choice questions
c. Fill in the blanks
d. True/False type

Any sub question may carry a maximum of 1 or 2 marks. Altogether candidate has to answer 4 questions out of 6 questions.

di. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Out of the 25 marks for internal, day-to-day work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted with external examiner and laboratory teacher. The external examiner shall be appointed by the Chief Controller of Examinations.

ei. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for subjective paper) and 75 marks for end examination. There shall be two internal tests in a Semester and average of the two shall be considered for the award of marks for internal tests. However in the I year class, there shall be three tests and the average of the three mid term examinations will be taken into consideration.

dii. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated with the project work in IV year II Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

dvii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, 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.

dviii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students’ understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.

dix. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the same committee appointed for industry oriented mini project. In addition the project supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from each other.
The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

6. Attendance Requirements:
   i. A student shall be eligible to appear for College End examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
   ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
   iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.
   iv. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year, as applicable. They may seek re-admission for that semester / I year when offered next.
   v. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.
   vi. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. Minimum Academic Requirements:
The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6
   i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
   ii. A student shall be promoted from II to III year only if he fulfils the academic requirement of 37 credits from one regular and one supplementary examinations of I year, and one regular examination of II year I semester irrespective of whether the candidate takes the examination or not.
   iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of total 62 credits from the following examinations, whether the candidate takes the examinations or not.
      a. Two regular and two supplementary examinations of I year.
      b. Two regular and one supplementary examinations of II year I semester.
      c. One regular and one supplementary examinations of II year II semester.
      d. One regular examination of III year I semester.
   iv. A student shall register and put up minimum attendance in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.
   v. Students who fail to earn 200 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

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

9. **Award of Class:**

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

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured for the best 200 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

10. **Minimum Instruction Days:**

The minimum instruction days for each semester / I year shall be 90/180 clear instruction days.

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

12. **General:**

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

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

iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the JBIET is final.

iv. The JBIET 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 JBIET.

*_**
**Academic Regulations for B. Tech. (Lateral Entry Scheme)**

(Effective for the students getting admitted into II year from the Academic Year 2011-2012 and onwards)

1. The Students have to acquire 150 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.
   - Register for **150** credits and secure **150** credits.

2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

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

4. **Promotion Rule:**
   - A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of **37 credits from the examinations**.
     - a. Two regular and one supplementary examinations of II year I semester.
     - b. One regular and one supplementary examinations of II year II semester.
     - c. One regular examination of III year I semester.

5. **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</th>
<th>Requirements</th>
<th>From the aggregate marks secured for 150 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td>(i.e. II year to IV year)</td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

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

6. All other regulations as applicable for B. Tech. Four-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>(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 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>4. Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td></td>
<td>all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>5</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</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 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></td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police 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>
</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 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>Clause</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>9.</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
<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>
</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.
J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
B.TECH. MECHANICAL ENGINEERING  

I YEAR  
COURSE STRUCTURE

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>L</th>
<th>T/P/D</th>
<th>C</th>
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<tbody>
<tr>
<td>6751001</td>
<td>English</td>
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<tr>
<td>6751002</td>
<td>Mathematics – I</td>
<td>3</td>
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<td>6751003</td>
<td>Engineering Mechanics</td>
<td>3</td>
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<tr>
<td>6751004</td>
<td>Engineering Physics</td>
<td>2</td>
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<tr>
<td>6751005</td>
<td>Engineering Chemistry</td>
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<tr>
<td>6751006</td>
<td>Computer Programming &amp; Data Structures</td>
<td>3</td>
<td>-</td>
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<tr>
<td>6751007</td>
<td>Engineering Drawing</td>
<td>2</td>
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<tr>
<td>6751008</td>
<td>Computer Programming Lab.</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6751009</td>
<td>Engineering Physics &amp; Engineering Chemistry Lab</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6751010</td>
<td>English Language Communication Skills Lab.</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6751011</td>
<td>Engineering Workshop / IT Workshop</td>
<td>-</td>
<td>3</td>
<td>4</td>
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<td><strong>Total</strong></td>
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<td><strong>18</strong></td>
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II YEAR I SEMESTER  
COURSE STRUCTURE

<table>
<thead>
<tr>
<th>Code</th>
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<th>P/D</th>
<th>C</th>
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<tbody>
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<tr>
<td>6753014</td>
<td>Probability and Statistics</td>
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<td>6753015</td>
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<td>6753016</td>
<td>Mechanics of Solids</td>
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<td>1</td>
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<td>6753017</td>
<td>Thermodynamics</td>
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<tr>
<td>6753018</td>
<td>Metallurgy and Materials Science</td>
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<tr>
<td>6753004</td>
<td>Electrical and Electronics Engineering Lab.</td>
<td>0</td>
<td>3</td>
<td>2</td>
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<td>6753005</td>
<td>Metallurgy &amp; Mechanics of Solids Lab</td>
<td>0</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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<td></td>
<td><strong>11</strong></td>
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II YEAR II SEMESTER  
COURSE STRUCTURE

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>L</th>
<th>T/P/D</th>
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<td>6754013</td>
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III YEAR I SEMESTER  
COURSE STRUCTURE

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### IV YEAR I SEMESTER

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**Note:** All End Examinations (Theory and Practical) are of three hours duration.  
T-Tutorial       L – Theory       P – Practical/Drawing       C – Credits
1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students’ handbooks. In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure by the students. Hence, it is suggested that they read it on their own with topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development and practice of language skills.

2. OBJECTIVES:

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

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

c. To develop the study skills and communication skills in formal and informal situations.

3. SYLLABUS:

Listening Skills:

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

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

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

Speaking Skills:

Objectives
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: Learning English : A Communicative Approach.)
- Just A Minute(JAM) Sessions.

Reading Skills:

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

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

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

Writing Skills:
Objectives
1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.

• Writing sentences
• Use of appropriate vocabulary
• Paragraph writing
• Coherence and cohesiveness
• Narration / description
• Note Making
• Formal and informal letter writing
• Editing a passage

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

For Detailed study

1. First Text book entitled “Enjoying Everyday English”, Published by Sangam Books, Hyderabad

For Non-detailed study
1. Second text book “Inspiring Speeches and Lives”, Published by Maruthi Publications, Guntur

A. STUDY MATERIAL:
UNIT-I
a. Sir C.V. Raman (Detail) A pathbreaker in the saga of Indian Science. (Detail)
b. Leading a team and Work brings Solace (from Wings of Fire)
   --University Press

UNIT-II
a. The Connoisseur (Detail) b.Mother Theresa (Non-detail)

UNIT-III
a. Kalpana Chawla “Inspiration” (Detail) b.Sam Pitroda (Non-detail)

UNIT-IV
a. Bubbling Well Road (Detail) b.I have a dream-Martin Luther king(Non-detail)

UNIT-V
a. The Cuddalore Experience(Detail) b.Amartya kumar Sen(Non-detail)

UNIT-VI
a. Youth, Awake, Arise- STOP NOT TILL
   Swami Vivekananda Institute of Human Excellence,
b. John F. Kennedy (Non-detail)

UNIT-VII
Exercises on;
Reading & Writing Skills Reading Comprehension Letter Writing Essay Writing

UNIT-VIII
Exercises on Remedial Grammar;
Common errors in English Subject-Verb agreement Tense aspect
Vocabulary development-Synonyms, Antonyms, One word substitutes, Prefixes-Suffixes, Idioms, Phrases, Words often
REFERENCES:
1. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books
2. English Grammar Practice, Raj N Bakshi, Orient Longman.
3. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Technical Communication, Meenakshi Raman, Oxford University Press
7. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
9. Murphy’s English Grammar with CD, Murphy, Cambridge University Press.
10. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
12. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
16. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
Mathematics – I

UNIT I: Sequences - Series
Basic definitions of Sequences and Series – Convergence and divergence – Ratio test – Comparison test – Integral test – Cauchy’s root test – Raabe’s test – Absolute and conditional convergence.

UNIT II: Differential equations of first order and their applications
Overview of differential equations – exact, linear and Bernoulli. Applications to Newton’s Law of Cooling, Law natural growth and decay, orthogonal trajectories and geometrical applications.

UNIT III: Higher Order Linear differential equations and their applications
Linear differential equations of second and higher order with constant coefficients, RHS term of the f(x)=e^{ax}, Cos ax, and x^n, e^{ax} V(x), x^n V(x) method of variation of parameters. Applications bending of beams, Electrical circuits, simple harmonic motion.

UNIT IV: Laplace transform and its application to Ordinary differential equations

UNIT V: Function of Single Variable
Rolle’s Theorem – Lagrange’s Mean Value Theorem – Cauchy’s mean value Theorem – Generalized mean value theorem (all theorems without proof) Functions of several variables – Functional dependence – Jacobian – Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT VI: Application of Single variable
Radius, Centre and Circle of Curvature-Evolutes and Envelopes Curve tracing – Cartesian, polar and parametric curves.

UNIT VII: Integration & its applications
Riemann Sums, integral Representation for lengths, Areas, Volumes and Surface areas in Cartesian and polar coordinates, multiple integrals – double and triple integrals – change of order of integration – change of variable.

UNIT VIII: Vector Calculus

TEXT BOOKS:
1. Engineering Mathematics by B.V.Ramana
2. Engineering Mathematics-I by T.K.V. Iyanar & B.Krishna Gandhi & Others, S.Chand

REFERENCES:
**J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY**  
**AUTONOMOUS**  

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**UNIT – I**  

**UNIT – II**  

**UNIT – III**  
**Friction**: Types if friction, limiting friction, laws of friction, static and dynamic friction, Application of friction to a single body and connecting systems, wedge.

**UNIT – IV**  
**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 – V**  
**Area moment of Inertia**: Definition – Polar Moment of Inertia, Transfer Theorems, Moments of Inertia of Composite Figures, Products 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 – VI**  
**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 – VII**  

**UNIT – VIII**  
**Principle of virtual work**: Equilibrium of ideal systems, efficiency of simple machines, stable and unstable equilibriums

**TEXT BOOKS**:

**REFERENCES**:
ENGINEERING PHYSICS

UNIT-I Physical Optics:
1. Interference: Types of Interferences, Interference in thin films (reflected light) - Newton's rings.
3. Polarization: Introduction to polarization, Malus law, double refraction, Nicol's prism, Brewster's law
Applications of Interference, Diffraction & Polarization in industry.

UNIT-II Crystallography – XRD methods

UNIT-III Defects in Crystals & Principles of Quantum Mechanics
6. Defects in Crystals: Point Defects: Vacancies, Substitution, Interstitial, Frenkel and Schottky Defects, Concentration of vacancies at given temperature, concentration of Schottky & Frenkel defects, Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger's Vector, Surface Defects and Volume Defects. (Qualitative treatment)

UNIT-IV Band Theory of Solids

UNIT-V Acoustics of Building & Acoustic Quieting and Ultrasonics

Ultrasonics:
Concept of ultrasonics wave generation, Different methods of generation of Ultrasonic’s (Piezoelectrical and Magnetostriction), Concept of NDT & Applications.

UNIT-VI Dielectric and Magnetic Properties
UNIT-VII Lasers and Fiber Optics


UNIT-VIII Nanotechnology


TEXT BOOKS:

7. Engineering Physics – Adeel Ahmad & B S Bellubbi (Florence Publication , Hyd)

REFERENCES:

1. Solid state physics -- M.Arumugam
2. Applied physics – Mani naidu
J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
AUTONOMOUS

I Year B.Tech.ME
6751005

ENGINEERING CHEMISTRY

UNIT I:

UNIT II:
Corrosion control methods – Cathodic protection, sacrificial anode, impressed current cathode. Surface coatings – methods of application on metals- hot dipping, galvanizing, tinning, cladding, electroplating - Organic surface coatings – paints constituents and functions.

UNIT III:
Polymers: Types of Polymerization, Mechanism (Chain growth & Step growth). Plastics:

UNIT IV:

UNIT V:

UNIT VI:

UNIT VII:
Phase rule: Definitions: phase, component, degree of freedom, phase rule equitation. Phase diagrams - one component system: water system. Two component system lead- silver system, heat treatment based on iron-carbon phase diagram, hardening, annealing.

UNIT VIII:
Introduction to analytical chemistry-IR, UV-Visible spectroscopy-theory and instrumentation -with simple examples.

TEXT BOOKS:

REFERENCE BOOKS
J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I Year B.Tech.ME

6751006

COMPUTER PROGRAMMING AND DATA STRUCTURES

UNIT - I

UNIT - II
Selection Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Programming examples.

UNIT - III
Designing Structured Programmes, Functions, basics, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programmes
Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C programme examples.

UNIT - IV
Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.
Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C programme examples.

UNIT - V
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, enumerated types, C programming examples.

UNIT - VI
Input and Output – Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C programme examples.

UNIT – VII
Searching and Sorting – Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

UNIT – VIII
Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack application-infix to postfix conversion, postfix expression evaluation, recursion implementation, Queues-operations, array and linked representations.

TEXT BOOKS :

REFERENCES:
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education
7. C Programming & Data Structures, E. Balagurusamy, TMH.
8. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
UNIT – I
   a) Conic Sections including the Rectangular Hyperbola – General method only.
   b) Cycloid, Epicycloid and Hypocycloid
   c) Involute.
   d) Scales: Different types of Scales, Plain scales comparative scales, scales of chords.

UNIT – II
DRAWING OF PROJECTIONS OR VIEWS ORTHOGRAPHIC PROJECTION IN FIRST ANGLE
PROJECTION: Principles of Orthographic Projections – Conventions – First and Third Angle, Projections of Points and Lines inclined to both planes, True lengths, traces.

UNIT – III
PROJECTIONS OF PLANES & SOLIDS: Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes. Projections of Regular Solids inclined to both planes – Auxiliary Views.

UNIT – IV
SECTIONS AND SECTIONAL VIEWS: Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT – V
DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right, Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids

UNIT - VI
INTERSECTION OF SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT – VII

UNIT – VIII
TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views – Conventions, Introduction to perspective projections(Practise not required)

TEXT BOOK:
1. Engineering Drawing, N.D. Bhat / Charotar
3. Engineering Drawing – Basant Agrawal, TMH

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

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

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

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

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

Week 4.
a) The total distance travelled by vehicle in ‘t’ seconds is given by distance = \( \frac{ut + \frac{1}{2}at^2}{t} \) where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of ‘u’ and ‘a’. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of ‘u’ and ‘a’.
b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Week 5.
a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

Week 6.
a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not

Week 7.
a) Write a C program that displays the position or index in the string S where the string T begins, or –1 if S doesn’t contain T.
b) Write a C program to count the lines, words and characters in a given text.

Week 8.
a) Write a C program to generate Pascal’s triangle.
b) Write a C program to construct a pyramid of numbers.

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

**Week 10**

a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of \( 1100 \) is \( 0010 \). Write a C program to find the 2’s complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 11**

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

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

**Week 12**

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

b) Write a C program to reverse the first \( n \) characters in a file.

(Note: The file name and \( n \) are specified on the command line.)

**Week 13**

a) Write a C programme to display the contents of a file.

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

**Week 14**

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

**Week 15**

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

**Week 16**

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

**Week 17**

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

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

**Week 18**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort

**Week 19**

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search
- ii) Binary search

**Week 20**

Write C program that implements the following sorting method to sort a given list of integers in ascending order:

- i) Quick sort

**Week 21**

Write C program that implement the following sorting method to sort a given list of integers in ascending order:

- i) Merge sort

**Week 22**

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

**Week 23**

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

**Week 24**

Write C programs to implement Trapezoidal and Simpson methods.

**Text Books**

4. Practical C Programming, Steve Qualline, O’Reilly, SPD. TMH publications.
ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB
(Any twelve experiments compulsory)

1. Dispersive power of the material of a prism – Spectrometer
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Study the characteristics of LED and LASER sources.
9. Study the characteristics of p-i-n and avalanche photodiode detectors.
11. Evaluation of numerical aperture of given fibre.
12. Energy gap of a material of p-n junction.
13. Thermo electric effect – Seebeck effect and Peltier effect.
14. Torsional pendulum.

ENGINEERING CHEMISTRY LAB
List of Experiments (Any 12 of the following):

Titrimetry:
- Estimation of hardness of water by EDTA method. (or) Estimation of calcium in limestone by Permanganometry.

Mineral Analysis:
- Determination of percentage of copper in brass
- Estimation of manganese dioxide in pyrolusite

Instrumental Methods:
4. Colorimetry:
   Determination of ferrous iron in cement by colorimetric method.
   (Or) Estimation of Copper by Colorimetric method.
5. Conductometry:
   Conductometric titration of strong acid Vs strong base.
   (Or) Conductometric titration of mixture of acids Vs strong base.
6. Potentiometry:
   Titration of strong acid Vs strong base by potentiometry.
   (Or) Titration of weak acid Vs strong base by potentiometry.

Physical Properties:
7. Determination of viscosity of sample oil by redwood/oswald’s viscometer
8. Determination Surface Tension of lubricants.

Identification and Preparations:
9. Identification of functional groups present in organic compounds.
10. Preparation of organic compounds
    Asprin (or) Benzimidazole

Kinetics:
11. To determine the rate constant of hydrolysis of methyl acetate catalysed by an acid and also the energy of activation. (or) To study the kinetics of reaction between K_2S_2O_8 and KI.
12. Demonstration Experiments (Any One of the following):
   a. Determination of dissociation constant of weak acid by PH meter
   b. Preparation of Thiokol rubber
   c. Adsorption on Charcoal
   d. Heat of reaction

TEXT BOOKS:
2. Inorganic quantitative analysis, Vogel.

REFERENCE BOOKS:
1. Text Book of engineering chemistry by R. N. Goyal and Harmendra Goel.
The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives:
1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

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

1. Introduction to the Sounds of English - Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
5. ‘Just A Minute’ Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
10. Giving Directions

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

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
   ii) Headphones of High quality
   iii) Suggested Software:
       • Cambridge Advanced Learners’ English Dictionary with CD.
       • The Rosetta Stone English Library.
       • Clarity Pronunciation Power – Part I.
       • Mastering English in Vocabulary, Grammar, Spellings, Composition
       • Dorling Kindersley series of Grammar, Punctuation, Composition etc.
       • Language in Use, Foundation Books Pvt Ltd with CD.
       • Oxford Advanced Learner’s Compass, 7th Edition.
       • Learning to Speak English - 4 CDs.
       • Vocabulary in Use, Michael McCarthy, Felicity O’Den, Cambridge.
       • Murphy’s English Grammar, Cambridge with CD.
       • English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):
1. A Handbook for English Language Laboratories – Prof. E. Suresh Kumar, P. Sreehari, Foundation Books.
3. English Conversation Practice by Grant Taylor, Tata McGraw Hill.
5. Communicate or Collapse: A Handbook of Effective Public Speaking, Group Discussions and Interviews, by Pushpa Lata & Kumar, Prentice-Hall of India.
7. Spoken English by R. K. Bansal & J. B. Harrison, Orient Longman.
8. English Language Communication: A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr. G. Natanam & Prof. S. A. Sankaranarayanan, Anuradha Publications, Chennai.
12. Spoken English: A foundation Course, Parts 1 & 2, Kamalesh Sadanand and Susheela punitha, Orient Longman

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Paper:
1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by an external examiner/ or the teacher concerned with the help of another member of the staff of the same department of the same institution.
1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring
6. Foundry
7. Welding
8. Power tools in construction, wood working, electrical engineering and mechanical engineering.
9. IT Workshop-I: Computer hard ware, identification of parts, Disassembly, Assembly of computer to working condition, Simple diagnostic exercises.
10. IT Workshop-II: Installation of Operating System Windows and Linux, simple diagnostic exercises.

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Machine Shop
3. Metal Cutting (Water Plasma)

TEXT BOOK:

2. Workshop Manual by Venkat Reddy

UNIT-II: NATURAL RESOURCES: Classification of Resources: Living and Non-Living resources, Renewable and Non-Renewable resources. Water resources: use and over utilization, Land resources, land degradation, Forest resources, Mineral resources uses. Energy resources: growing energy needs, use of alternate energy sources-case studies. Environmental effects due to exploitation of various resources.

UNIT-III: BIODIVERSITY AND BIOTIC RESOURCES: Species, ecosystem diversity, Hotspots, Value of biodiversity, Threats to biodiversity, Conservation of biodiversity: In-Situ and Ex-Situ conservation, Biological disasters, pandemic and epidemics, Biological warfare.

UNIT-IV: ENVIRONMENTAL POLLUTION AND CONTROL: Classification of pollutions and pollutants, causes, effects of water, air, noise pollution, Introduction to control technologies: Water (primary, secondary, tertiary), Air(particulate and gaseous emissions), Soil(conservation and remediation), Noise(controlling devices) Solid waste : types, collection and disposal methods, characteristics of e-waste and its management.


Text Book:
1. TEXT BOOK OF ENVIRONMENTAL Science and Technology by M.Anji Reddy 2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao
3. Introduction to Environmental Studies by K.Mukkanti

References
1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph
2. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press
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#### PROBABILITY AND STATISTICS

**UNIT-I**: Probability:

**UNIT-II**: Distributions
Binomial , Poisson & normal distributions related properties . Sampling distributions – Sampling distribution of means (σ known and Unknown)

**UNIT-III**: Testing of Hypothesis I
Tests of hypothesis point estimations – interval estimations Bayesian estimation. Large samples, Null hypothesis – Alternate hypothesis type I, & type II errors – critical region confidential interval for mean testing of single variance. Difference between the mean.

**UNIT-IV**: Testing of Hypothesis II
Confidential interval for the proportions. Tests of hypothesis for the proportions single and difference between the proportions.

**UNIT-V**: Small samples
Confidence interval for the t- distribution – Tests of hypothesis – t- distributions, F- distributions χ² distribution. Test of Hypothesis.

**UNIT-VI**: Correlation & Regression
Coefficient of correlation – Regression Coefficient – The lines of regression – The rank correlation

**UNIT-VII**: Queuing Theory
Arrival Theorem – Pure Birth process and Death Process M/M/1 Model. MATLAB/R Introduction.

**UNIT-VIII**: Stochastic processes

#### TEXT BOOKS:
3. Introduction to MATLAB by Rudra Gupta

#### REFERENCES:
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ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - I
ELECTRICAL CIRCUITS: Basic definitions, Types of elements, Ohm’s Law, Resistive networks, Kirchhoff’s Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT - II

UNIT - III

UNIT - IV

UNIT - V
INSTRUMENTS: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT - VI
DIODE AND IT’S CHARACTERISTICS: P-n junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)

UNIT - VII
TRANSISTORS: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications

UNIT - VIII

TEXT BOOKS:
2. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin/Pearson.

REFERENCES:
MECHANICS OF SOLIDS

UNIT – I

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 contra flexure – 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 beams sections like rectangular, circular, triangular, I, T and angle sections.

UNIT – V
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 & simply–supported trusses by method of joints, method of sections & tension coefficient methods.

UNIT – VI
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 – VII

UNIT – VIII
Introduction-Type of columns-short, medium and long columns-Axially loaded compression members-Crush load-Euler’s theorem for long columns-assumptions-derivations of Euler’s critical load formulae for various end conditions-Equilibrium length of a column-2lenderness ration-Euler’s critical stress-Limitations of Euler’s theory-Rankine-Gordon formula.

TEXT BOOKS:
1. Strength of Materials by S.Timshenko
2. Solid Mechanics, by Popov

REFERENCES:
5. Analysis of structures by Vazirani and Ratwani.
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THERMODYNAMICS

UNIT – I

UNIT II

UNIT – III

UNIT IV

UNIT - V

UNIT – VI

UNIT - VII

UNIT VIII

TEXT BOOKS :
1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH

REFERENCES :
1. An introduction to Thermodynamics - YVC Rao / University press
3. Engineering Thermodynamics – Jones & Dugan
5. Thermodynamics – J.P.Holman, McGrawHill
7. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen , John Wiley & sons (ASIA) Pte Ltd
METALLURGY AND MATERIAL SCIENCE

UNIT – I
Structure of Metals : Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

UNIT - II
Constitution of Alloys : Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT -III

UNIT -IV
Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron, Spherodial 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 – V

UNIT - VI

UNIT – VII
Ceramic materials : Crystalline ceramics, glasses, cermets, abrasive materials, nanomaterials –definition, properties and applications of the above.

UNIT - VIII

TEXT BOOKS :
1. Introduction to Physical Metallurgy / Sidney H. Avener.

REFERENCES :
1. Material Science and Metallurgy/kodgire.
2. Science of Engineering Materials / Agarwal
4. Elements of Material science / V. Raghavan
5. An introduction to materials science / W.g.vinas & HL Mancini
6. Material science & material / C.D.Yesudian & harris Samuel
Section A: Electrical Engineering:

The following experiments are required to be conducted as compulsory experiments:

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.

In addition to the above four experiments, any one of the experiments from the following list is required to be conducted:

5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C Shunt Motor

Section B: Electronics Engineering:

1. Transistor CE Characteristics (Input and Output)
2. Full wave Rectifier with and without filters.
3. CE Amplifiers.
4. RC Phase Shift Oscillator
5. Class A Power Amplifier
6. Micro Processor
METALLURGY AND MECHANICS OF SOLIDS LAB

(A) 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.

(B) 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) Brinell hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

NOTE: Any 10 experiments from the above are to be conducted taking atleast 4 from each section.
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, Design of Gating systems

UNIT – II
Methods of Melting : Crucible melting and cupola operation, steel making processes.

UNIT – III
A) Welding : Classification of welding processes, types of welds and welded joints their characteristics, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water ) welding.
B) Cutting of Metals : Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

UNIT – IV

UNIT – V
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

UNIT - VI

UNIT- VII
EXTRUSION OF METALS : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

UNIT - VIII
Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods and Equipment (blow &injection molding)

TEXT BOOKS :
2. Manufacturing Technology - P.N. Rao, TMH

REFERENCES :
1. Production Technology / R.K. Jain
3. Principles of Metal Castings - Roenthal.
4. Welding Process - Paramar
UNIT – I
MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

UNIT - II

UNIT – III
KINEMATICS : Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.
Analysis of Mechanisms : Analysis of slider crank chain for displacement , velocity and acceleration of slider – Acceleration diagram 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

UNIT – V
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. 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 – VI
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 – VII
Belt Rope and Chain Drives : 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.

UNIT – VIII

TEXT BOOKS :
1. Theory of Machines by Thomas Bevan, CBS
2. Theory of Machines - R.K Bansal

REFERENCES :
3. Theory of Machines Sadhu Singh Pearsons Edn
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APPLIED THERMODYNAMICS - I

UNIT – I

UNIT-II

UNIT – III
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
a) Fuels classifications of fuels, combustions equations.


UNIT – V

UNIT – VI
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 VII
Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.


UNIT-VIII
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. IC Engines – Ramalingam, Scietech publishers
3. Thermal Engineering / Rajput /Lakshmi Publications.

REFERENCES:
2. Engineering fundamentals of IC Engines – Pulkabek / Pearson /PHI
3. Thermal Engineering / Radamooorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood/ McGrawHill.
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MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

UNIT I
Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

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

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

UNIT III
Closed conduit flow: Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle

UNIT IV
BOUNDARY LAYER CONCEPTS: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers ( No derivation ) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

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

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

UNIT VIII
Centrifugal pumps: Classification, working, work done – barometric head- losses and efficiencies specific speed- performance characteristic curves, NPSH.

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

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

REFERENCES:
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
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
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:
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:
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NUMERICAL METHODS

UNIT-I: Roots of Nonlinear equations

UNIT-II: Solution of linear equations:

UNIT-III: Interpolation:

UNIT-IV: Least squares method:
Linear, Non linear and curvilinear curve fitting – Multiple linear regression

UNIT – V: Numerical differentiation and integration
Numerical differentiation and integration Trapezoidal rule, simpson’s 1/3 rule and 3/8th rule.

UNIT – VI : Numerical solution of Initial value Problems in Ordinary Differential Equations

UNIT-VII: Boundary values & Eigen value problems
Shooting method, Finite difference method and solving eigen values problems, power method.

UNIT-VIII: Solution of partial differential equations

TEXT BOOKS:
2. An Introduction to Numerical Analysis by S.S.Sastry – PHI Learning
3. Numerical Methods by Jain, Iyengar & Jain

REFERENCES:
1. Numerical Methods by S. Armugam & Others Scitech.
2. Introduction to Numerical Analysis by K.E. Aitkinson, Wiley Publications.
3. Numerical Analysis by Scarborough, Oxford IVH.
Minimum of 12 Exercises need to be performed

**I. METAL CASTING LAB:**
1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise - for strengths, and permeability – 1 exercise
3. Moulding Melting and Casting - 1 Exercise

**II WELDING LAB:**
1. Arc Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises

**III MECHANICAL PRESS WORKING:**
3. Bending and other operations

**IV PROCESSING OF PLASTICS:**
1. Injection Moulding
2. Blow Moulding

**REFERENCE BOOK:**
MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
10. Determination of friction factor for a given pipeline.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli’s Theorems

Note: Any 10 of the above 12 experiments are to be conducted.
UNIT I Introduction to Managerial Economics:

UNIT II Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

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

UNIT IV Introduction to Markets & Pricing Policies:
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.


UNIT VI Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.
Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)


UNIT VIII Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS:

REFERENCES:

Prerequisites: Nil
Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions. Out of eight questions 4 questions will be theory questions and 4 questions should be problems. Each question should not have more than 3 bits.
UNIT – I
LENGTH MEASUREMENT: Slip gauges – calibration of the slip gauges, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Surface plate, rollers and spheres used to determine the tapers.
LIMIT GAUGES: Taylors principle – Design of Go and No Go gauges, plug ring, snap, Feeler, taper and profile gauges.

UNIT – II
SYSTEMS OF LIMITS AND FITS: Introduction, Length standard, line and end standard nominal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchange ability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain and screwed work.

UNIT – III
OPTICAL MEASURING INSTRUMENTS: Tool maker’s microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.

UNIT – IV

UNIT – V
MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

UNIT – VI
SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, Thread Profile Gauge.

UNIT – VII
SURFACE ENGINEERING: Surface texture and properties, Surface cleaning techniques, Surface integrity, Wear and its measurements, Lubricants and its selection for reducing wear, Principles of corrosion and remedial measures, Laser applications for surface modifications.

UNIT – VIII
SURFACE TREATMENTS: Mechanical surface treatment and coatings, casehardening and surface coating, thermal spraying, Vapour deposition, Ion implantation, Diffusion coating, Electro plating, Electroless plating and Electro forming, Ceramic, Organic and Diamond coating

TEXT BOOKS:

REFERENCES:
1. Fundamentals of Dimensional Metrology, 4e, Connie Dotson, Thomson, 2003
2. Surface Engineering with Lasers/ Dehosson J.T.
DYNAMICS OF MACHINERY

UNIT – I
PRECESSION:
Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II
STATIC AND DYNAMIC FORCE ANALYSIS OF PLANAR MECHANISMS:

UNIT – III
SYNTHESIS OF LINKAGES:

UNIT – IV
CLUTCHES: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

UNIT – V
TURNING MOMENT DIAGRAM AND FLY WHEELS:
Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

UNIT – VI
GOVERNORS:

UNIT – VII
BALANCING:
Balancing of rotating masses Single and multiple – single and different planes. Balancing of Reciprocating Masses; Primary and Secondary balancing of reciprocating masses. Analytical and graphical methods - Unbalanced forces and couples – Balancing of “V” , multi cylinder, In line and radial engines for primary and secondary balancing, locomotive balancing.

UNIT – VIII
VIBRATION:
Free Vibration of mass attached to vertical spring – Simple problems on forced damped vibration Vibration Isolation & Transmissibility- Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

TEXT BOOKS:
1. Theory of Machines by T.Bevan, Pearson Education
2. Theory of Machines by SS Ratan, Mc Graw Hill

REFERENCES:
4. Theory of Machines and Mechanisms by Uicker, Pennock and Shigley, Oxford
MACHINE TOOLS

UNIT – I
Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

UNIT – II
Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes – tool layout and cam design.

UNIT – III
Shaping slotting and planing machines – Principles of working – Principal parts – specification classification, operations performed. Kinematic schemes of shaping, slotting and planning machines, machining time calculations.

UNIT – IV

UNIT – V

UNIT – VI

UNIT – VII
Lapping, honing and broaching machines – comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations, Broaching machines and tools.

UNIT – VIII

TEXT BOOKS:

REFERENCES:
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

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DESIGN OF MACHINE MEMBERS - I

UNIT – I


UNIT – II

UNIT – III

UNIT – IV
BOLTED JOINTS: Design of bolts with pre-stresses – Design of joints under eccentric loading – bolt of uniform strength, Cylinder cover joints.

UNIT – V
AXIALLY LOADED JOINTS: Keys, Cotters And Knuckle Joints: Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT – VI

UNIT – VII

UNIT – VIII

TEXT BOOKS:
1. Mechanical Engineering Design by Bahl and Goel, Standard Publications

REFERENCES:
UNIT – I

UNIT II

UNIT – III
Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in 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.

UNIT – IV
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 - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

UNIT V

UNIT VI
Steam Condensers: Requirements of steam condensing plant – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement.

UNIT – VII

UNIT – VIII

TEXT BOOKS :
2. Gas Turbines – V.Ganesan /TMH

REFERENCES :
1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
3. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
METROLOGY AND MACHINE TOOLS LAB

Section A :
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 teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
6. Tool makers microscope and its application
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method or Tool makers microscope.
10. Surface roughness measurement by Taly Surf.

Section B :
1. Introduction of general purpose machines -Lathe, Drilling machine, Milling machine, Shaper,
2. Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
3. Step turning and taper turning on lathe machine
4. Thread cutting and knurling on -lathe machine.
5. Drilling and Tapping
6. Shaping and Planing
7. Slotting
8. Milling
9. Cylindrical Surface Grinding
10. Grinding of Tool angles.
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THERMAL ENGINEERING LAB

Perform any 10 out of the 12 exercises

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. Evaluate of engine friction by conducting motoring /retardation test on 4 stroke diesel Engine.
7. Determination of A/F Ratio and Volumetric Efficiency on IC Engines.
8. Determine of Economical speed test for fixed load on 4-stroke Engine.
9. Determine optimum cooling water temperature on IC Engine
10. Dis-assembly / Assembly of Engines.
11. Performance test on Reciprocating Air-compressor unit.
12. Study of Boilers.
UNIT I

UNIT II

UNIT III
Operations Management: Principles and Types of Plant Layout- Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement - Statistical Quality Control: $\bar{X}$ chart, R chart, c chart, $p$ chart.

UNIT IV

UNIT V
A) Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, VED Analysis, FSN Analysis, Purchase Procedure, Stores Management - Logistics and basics of supply Chain Management.

UNIT VI

UNIT VII

UNIT VIII

REFERENCE BOOKS:
1. Aryasri: Management Science, TMH, New Delhi, 2009
2. Stoner, Management, Pearson, 2009

Pre-requisites: Managerial Economics

Objective: To familiarize with the process of management and to provide basic insights into select contemporary management practices.

Codes/Tables: Normal Distribution Function Table need to be permitted into the examination Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions. The question paper should contain atleast 2 practical problems, one each from units – III & IV

Each question should not have more than 3 bits.

UNIT VIII will have only short questions, not essay questions.
FINITE ELEMENT METHODS

UNIT -I:
Introduction to FEM: basic concepts, historical background, application of FEM, general description, comparison of FEM with other methods. Basic equations of elasticity, Stress – Strain and strain - displacement relations. Rayleigh- Ritz method, Weighted residual methods.

UNIT -II:
One Dimensional problems: Stiffness equations for axial bar element using Potential Energy approach and Virtual energy principle - Finite element analysis of uniform, stepped and tapered bars subjected to mechanical and thermal loads - Assembly of Global stiffness matrix and load vector - Quadratic shape functions - properties of stiffness matrix.

UNIT -III:

UNIT -IV:

UNIT -V:
2-D problems: CST - Stiffness matrix and load vector - Isoparametric element representation – Shape functions – convergence requirements – Problems.

UNIT – VI:
Two dimensional four noded isoparametric elements - Numerical integration - Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements - 3-D problems – Tetrahedran element.

UNIT -VII:

UNIT -VIII:

TEXT BOOKS:

REFERENCES:
1. Finite Element Methods/ Alavala/TMH
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REFRIGERATION AND AIR CONDITIONING

UNIT – I

Air Refrigeration: Bell Coleman cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air crafts.

UNIT – II

UNIT III

UNIT IV

UNIT V

UNIT – VI
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.

UNIT VII
Requirements of human comfort and concept of effective temperature: Comfort chart –Comfort Air conditioning – Requirements of Industrial air conditioning , Air conditioning Load Calculations.

UNIT – VIII
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. Refrigeration and Air Conditioning / CP Arora / TMH.
2. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai

REFERENCES :
1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.
3. Basic Refrigeration and Air-Conditioning – Ananthanarayan / TMH
UNIT – I

UNIT – II
ROLLING CONTACT BEARINGS: Types of rolling contact bearings – selection of bearing type – selection of bearing life - Design for cyclic loads and speeds – Static and dynamic loading of ball & roller bearings.

UNIT – III
DESIGN OF IC 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 – IV
POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by Belt and Rope drives , Transmission efficiencies, Belts – Flat and V types – Ropes for belt and rope drives, Materials, Chain drives.

UNIT – V

UNIT – VI

UNIT – VII
DESIGN OF POWER SCREWS: Design of screw, Square ACME , Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT – VIII

TEXT BOOK :
3. Design Data Books - P.S.G. College of Technology - Mahadevan

REFERENCES :
4. Design of machine elements by Pandya and Shah
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HEAT TRANSFER

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.

UNIT – II
Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – Initial and boundary conditions.

UNIT III
One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance – Significance of Biot and Fourier Numbers – Heisler Chart solutions of transient conduction systems- Concept of Functional Body

UNIT – IV

UNIT – V
Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and pipes.

UNIT VI
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.

UNIT VII

UNIT VIII

TEXT BOOKS :
1. Heat Transfer / HOLMAN/TMH

REFERENCE BOOKS:
5. Essential Heat Transfer - Christopher A Long / Pearson Education
7. Heat and Mass Transfer-Kondandaraman
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ENGINEERING OPTIMIZATION
(OPEN ELECTIVE)

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI
a) Geometric Programming: Posynomials – arithmetic – geometric inequality – unconstrained GP- constrained GP(≤ type only)
b) Integer Programming- Introduction – formulation – Gomory cutting plane algorithm – branch and bound method

UNIT – VII

UNIT – VIII
a) Simulation-Definition-Steps involved- Types of simulation Models-Advantages and disadvantages- Simple problems on queuing & inventory.
b) Non-traditional optimization algorithms: Genetic algorithms: working principles differences and similarities between Gas and traditional methods. Simulated annealing.

Text Books

Reference Text books
Unit-I:
Introduction to nanotechnology:
Importance of nanoscale, Nanostructure types, electronic, magnetic, optical Properties of Nanomaterials, top-down and bottom-up approach to nanostructures.

Unit-II:
Quantum Mechanical phenomenon in nanostructures:
Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

Unit-III
Carbon Nano Structures:
Carbon nanotubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

Unit-IV
Fabrication of Nanomaterials:
Physical Methods: Inert gas condensation, Arc discharge, RFplasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

Unit-V
Nano scale characterization techniques:
Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

Unit-VI
Nanodevices and Nanomedicine:
Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

Unit-VII
Nano and molecular electronics:
Resonant-Tunneling structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

Unit-VIII
nanolithography and nanomanipulation:

TEXT BOOKS:
2. Springer Handbook of Nanotechnology - Bharat Bhusan
3. Phani kumar, principles of nanotechnology, scitech publications

REFERENCES BOOKS:
4. Encyclopedia of Nanotechnology- Hari Singh Nalwa
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UNIT – I

UNIT – II
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.

UNIT – III
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

UNIT – V
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 – VI

UNIT – VII
Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
Braking System: Types of Brakes, Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

UNIT – VIII
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.

TEXT BOOKS:
1. Automobile Engineering / William Crouse, TMHill Publishers

REFERENCES:
1. Automotive Mechanics / G.B.S. Narang
2. Automotive Mechanics / Heitner
3. Automotive Engines / Srinivasan
4. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.
5. Automotive Engineering / Newton Steeds & Garrett
**HEAT TRANSFER LAB**
(Consider Performance in Any 12)

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<td>1.</td>
<td>Composite Slab Apparatus – Overall heat transfer co-efficient.</td>
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<td>2.</td>
<td>Heat transfer through lagged pipe.</td>
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<td>3.</td>
<td>Heat Transfer through a Concentric Sphere</td>
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<td>4.</td>
<td>Thermal Conductivity of given metal rod.</td>
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<td>5.</td>
<td>Heat transfer in pin-fin</td>
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<td>6.</td>
<td>Experiment on Transient Heat Conduction</td>
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<td>8.</td>
<td>Heat transfer in natural convection</td>
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<td>9.</td>
<td>Parallel and counter flow heat exchanger.</td>
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<td>11.</td>
<td>Stefan Boltzman Apparatus.</td>
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<td>14.</td>
<td>Study of Two – Phase flow.</td>
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ADVANCED ENGLISH COMMUNICATION SKILLS LAB

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

The proposed course should be an integrated theory and lab course to enable students to use ‘good’ English and perform the following:

- Gather ideas and information, to organise ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:
This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

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

- **Functional English** - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- **Vocabulary Building** – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
- **Reading Comprehension** – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, Critical reading.
- **Writing Skills** – structure and presentation of different types of writing – Resume writing / e-correspondence/Technical report writing/Portfolio writing – planning for writing – research abilities/data collection/organizing data/tools/analysis – improving one’s writing.
- **Group Discussion** – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars and written presentations through posters/projects/reports/PPTs/e-mails/assignments etc.
- **Interview Skills** – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

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

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T.V., a digital stereo –audio & video system and camcorder etc.

**System Requirement (Hardware component):**
*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

iii) **P – IV Processor**
   a. Speed – 2.8 GHZ
   b. RAM – 512 MB Minimum
   c. Hard Disk – 80 GB

iv) Headphones of High quality
5. Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:
- Clarity Pronunciation Power – part II
- Oxford Advanced Learner’s Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from ‘train2success.com’
  - Preparing for being Interviewed,
  - Positive Thinking,
  - Interviewing Skills,
  - Telephone Skills,
  - Time Management
  - Team Building,
  - Decision making
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

DISTRIBUTION AND WEIGHTAGE OF MARKS:
Advanced Communication Skills Lab Practicals:
1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.
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IV Year B.Tech. ME - I Sem
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OPERATIONS RESEARCH

UNIT – I

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

UNIT – VI
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- Single period model.

UNIT – VII

UNIT – VIII
Simulation: Definition – Types of simulation models – phases of simulation- applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Brief Introduction of Simulation Languages.

TEXT BOOKS:
1. Operations Research /J.K.Sharma 4e. /MacMilan

REFERENCES :
3. Introduction to O.R /Taha 8e/PHI
5. Operations Research / S.D.Sharma-Kedarnath
6. O.R/Wayne L.Winston/Thomson Brooks/cole
7. Introduction to O.R/Hiller & Libermann (TMH).
POWER PLANT ENGINEERING

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.

UNIT II

UNIT – III

UNIT IV

UNIT – V
Hydro Projects And Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT VI
Direct Energy Conversion: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation, Types of MHD.

UNIT – VII

UNIT – VIII

TEXT BOOK :

REFERENCES :
1. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications
2. Power plant Engineering/ Ramalingam/ Scietech Publishers
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.

UNIT – II
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 – III
Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT – IV
Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – V

UNIT – VI

UNIT – VII
Computer aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

UNIT – VIII
Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS :
1. CAD / CAM A Zimmers & P.Groover/PE/PHI
2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

REFERENCES :
1. Automation , Production systems & Computer integrated Manufacturing/ Groover/P,E
3. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
4. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
5. CAD/CAM: Concepts and Applications/Alavala/ PHI
UNIT – I

UNIT – II
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 – III

UNIT – IV
Measurement of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubbler level indicators.

UNIT – V

UNIT – VI

UNIT – VII
Measurement Of Humidity: Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter

UNIT – VIII

Pre-Requisite:
Objective: This subject provides insight into the different mechanical measurement systems and working and testing procedures

TEXT BOOKS:
Measurement Systems: Applications & Design by D.S Kumar, Anuradha Agencies
Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH

REFERENCE BOOKS:
Instrumentation and Control systems/ S.Bhaskar/ Anuradha Agencies
1. Experimental Methods for Engineers / Holman
3. Mechanical Measurements / Sirohi and Radhakrishna / New Age
UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – IV

UNIT VI
Trajectory planning: Joint space scheme – cubic polynomial fit – Avoidance of obstacles – Types of motion: Slew motion - joint interpolated motion – straight line motion – problems.

UNIT VII

UNIT VIII
Robot Application in Manufacturing: Material handling - Assembly and Inspection.

TEXT BOOKS:
1. Industrial Robotics / Groover M P /Pearson Edu.

REFERENCES:
3. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
5. Robotics and Control / Mittal R K & Nagrath I J / TMH
UNIT I
Single degree of Freedom systems - I: Undamped and damped free vibrations; forced vibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and transmissibility.

UNIT II
Single degree of Freedom systems - II: Response to Non Periodic Excitations: UNIT Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT III
Vibration measuring instruments: Vibrometers, velocity meters & accelerometers

UNIT IV
Two degree freedom systems: Principal modes- undamped and damped free and forced vibrations; undamped vibration absorbers;

UNIT V
Multi degree freedom systems: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi-rotor systems and geared systems; Discrete- Time systems.

UNIT VI
Numerical Methods: Raleigh’s stodola’s, Matrix iteration, Rayleigh- Ritz Method and Holzer's methods.

UNIT VII

UNIT VIII
Critical speeds of shafts: Critical speeds without and with damping, secondary critical speed.

TEXT BOOKS:
1. Elements of Vibration Analysis by Meirovitch, TMH, 2001
REFERENCES:
1. Mechanical Vibrations by SS Rao, Pearson, 2009, Ed 4,
5. Mechanical Vibrations- S Graham Kellyk, Schaum's Outlines, TMH 2009-10
UNIT – I
Introduction: Definition – Trends - Control Methods: Stand alone, PC Based (Real Time Operating Systems, Graphical User Interface, Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

UNIT – II

UNIT – III

UNIT – IV
Electronic Interface Sub systems: TTL, CMOS interfacing - Sensor interfacing - Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC’s - Protection schemes – circuit breakers , over current sensing , reset able fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – V
Electromechanical Drives : Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives, PWM’s - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – VI

UNIT – VII

Unit – VIII

TEXT BOOKS:
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES:
Unit-I

Unit-II

Unit-III
Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man lay up, pultrusion, RTM.

Unit-IV

Unit-V

Unit-VI

UNIT-VII

UNIT-VIII

TEXT BOOKS:
UNCONVENTIONAL MACHINING PROCESSES
(ELECTIVE – II)

UNIT – I
Introduction: Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection, Applications.

UNIT II
Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – III
Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT - IV

UNIT - V

UNIT – VI
Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes – General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-VII
Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Chemical machining-principle- maskants –etchants- applications.

UNIT – VIII
Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, Shaped tube electrolytic machining.

TEXT BOOKS:
1. Advanced machining processes/ VK Jain/ Allied publishers.

REFERENCES:
1. Modern Machining Process / Pundey P.C. and Shah H.S./ TMH.
3. Unconventional Machining Processes/ C. Elanchezhian, B. Vijaya Ramnath and M Vijayan/ Anuradha Publications/ 2005
UNIT I:
Features of NC Machines: Fundamentals of numerical control, advantage of NC systems, classification of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems, Features of NC Machine Tools, design consideration of NC machine tool, methods of improving machine accuracy.

UNIT II:

UNIT III:
Tooling for CNC Machines: Tool presetting, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers.

UNIT IV:
NC Part Programming: Manual programming-Basic concepts, Point to Point contour programming, canned cycles, parametric programming.

UNIT V:
Computer-Aided Programming: General information, APT programming, Examples APT programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT VI:

UNIT VII:

UNIT VIII:
Programming Logic Controllers (PLCs): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC’s in CNC Machines.

TEXT BOOKS:
2. CAD/CAM – Michel P.Groover, TMH

REFERENCES:
2. Mechatronics – HMT, TMH.
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AUTOMATION IN MANUFACTURING
(ELECTIVE – II)

UNIT – I
Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and too changing and machine tool control transfer the automaton.

UNIT – II
Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – III
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 – IV
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – V
Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

UNIT -VI
Automated storage and retrieval systems; work in process storage, interfacing handling and storage withmanufacuring.

UNIT – VII
Fundamentals of Industrial controls: Review of control theory, logic controls, sensors and actuators, Data communication and LAN in Manufacturing

UNIT – VIII
Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

TEXT BOOK:

REFERENCES:
UNIT I:
Introduction: Design philosophy – Steps in Design process – General Design rules for Manufaturability – Basic principles of designing for economical production – Creativity in design.

UNIT II:

UNIT III:
Machining Process: 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 IV:
Metal Casting: Appraisal of various casting processes, Selection of casting process, General design considerations for casting – casting tolerances – Use of Solidification Simulation in casting design – Product design rules for sand casting.

UNIT V:

UNIT VI:
Forging: Design factors for Forging – Closed die forging design – parting lines of dies – Drop forging die design – General design recommendations

UNIT VII:

UNIT VIII:
Design For Assembly: General design guidelines for Manual Assembly- Development of Systematic DFA Methodology- Assembly Efficiency-Classification System for Manual handling- Classification System for Manual Insertion and Fastening- Effect of part symmetry on handling time-

TEXT BOOKS:

REFERENCE BOOK:
COMPUTER AIDED DESIGN AND MANUFACTURING LAB

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, DDXE 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 CNC part program for turning components and milling components.


   f) Quality Control and inspection.

Any Six Software Packages from the following:

Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.
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PRODUCTION DRAWING PRACTICE AND INSTRUMENTATION LAB

a) Production Drawing Practice

UNIT – I

UNIT – II
Limits and Fits : Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

UNIT – III
Form and Positional Tolerances: Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

UNIT – IV
Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

UNIT – V
Heat treatment and surface treatment symbols used on drawings.

UNIT – VI
Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – VII
Part drawing using computer aided drafting by CAD software

TEXT BOOKS:
2. Machine Drawing with Auto CAD- Pohit and Ghosh, PE

REFERENCES:

(b) INSTRUMENTATION LAB

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a roto meter for flow measurement.
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.
PRODUCTION PLANNING AND CONTROL

UNIT-I
Introduction: Definitions – objectives of production planning and control- functions of production planning and control- elements of production control- types of production control- organization of production planning and control – internal organizations department

UNIT-II
Forecasting – Importance of forecasting – types of forecasting, their uses- general principles of forecasting techniques- Qualitative methods and quantitative methods.

UNIT-III
Inventory management – Functions inventory- Relevant inventory cost- ABC analysis- VED Analysis- EOQ model – Inventory control systems – P- Systems and Q – Systems

UNIT – IV
Introduction to MRP And ERP, LOB( Line of balance ), JIT inventory, Japanese concepts.

UNIT- V

UNIT- VI
Scheduling polices – techniques, standard scheduling methods- job shop, flow shop,

UNIT-VII
Line balancing, aggregate planning- methods for aggregate planning- Chase planning, expediting, control aspects.

UNIT-VIII
Dispatching – Activities of dispatcher- Dispatching procedure - follow up – definition – reasons for existence of functions – types of follow up, applications of computer in production planning control

TEXT BOOKS:
1. Production Planning and Control – M.Mahajan- Dhanpati rai & Co
2. Production Planning and Control- Jain & Jain – Khanna publications

REFERENCE BOOKS:
1. Production Planning and Control- Text & cases/ SK Mukhopadhyaya /PHI.
3. Operations Management by Chase/PHI
4. Management Science – A R Aryasri- 4e –TMH
5. Operations management – Heizer- Pearson
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 Networks

UNIT II
Learning Process – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaptation, Statistical nature of the learning process

UNIT III
Single layer perceptrons – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron – convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment

UNIT IV
Multilayer Perceptron – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection

UNIT V

UNIT VI
Self Organization Maps – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive pattern classification

UNIT VII
Neuro Dynamics – Dynamical systems, stability of equilibrium states, attractors, neuro dynamical models, manipulation of attractors as a recurrent network paradigm

UNIT VIII
Hopfield Models – Hopfield models, computer experiment

TEXT BOOK:

REFERENCES:
1. Artificial neural networks - B.Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
UNIT - I

Unit-II

Unit-III
Component reliability and hazard models: Introduction, Component reliability from test data, Mean time to failure, Time-dependent hazard models, Stress-Dependent hazard models, Derivation of reliability function using Markov, Treatment of field data.

Unit-IV

Unit-V

Unit-VI

Unit-VII

Unit-VIII
Reliability management: Reliability programming - Management policies and decision - Reliability management by objectives - Reliability group - Reliability data: Acquisition and analysis - Managing people for reliability.

TEXT BOOKS:
1. Reliability Engineering – Balaguruswamy - TMHill
2. Reliability Engineering- L.S.Srinath

REFERENCE BOOKS:
1. Reliability Engineering- Patrick DTO-Wiley Conor-India
2. Reliability Engineering and life testing -Naikan-PHI
INTRODUCTION:


UNIT-II

Maintenance Management And Control:


UNIT-III

Types of maintenance:


UNIT-IV

Inventory Control In Maintenance:

Inventory Control Objectives and Basic Inventory Decisions, ABC Inventory Control Method, Inventory Control Models, Two-Bin Inventory Control and Safety Stock, Spares Determination Factors, Spares Calculation Methods.

UNIT-V

Quality And Safety In Maintenance:


UNIT-VI

Maintenance Costing:


UNIT-VII

Reliability, Reliability Centered Maintenance, RCM:


UNIT-VIII

Maintainability:


TEXT BOOKS

1. Reliability, Maintenance and Safety Engineering by Dr. A.K.Gupta/ Laxmi Publications.
2. Industrial Safety Management by L. M. Deshmukh/TMH

REFERENCES:

1. Maintenance Engineering & Management by R.C.Mishra/ PHI
2. Reliability Engineering by Elsayed/ Pearson
UNIT – I
Introduction - Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures, Overview of the plant layout

UNIT – II
Process layout & Product layout: Group Layout(Manufacturing Cell)Selection, specification, Implementation and follow up, comparison of layout

UNIT – III
Heuristics for Plant layout – ALDEP, CORELAP, CRAFT

UNIT – IV
Group Layout, Fixed position layout- Quadratic assignment model. Branch and bound method

UNIT – V
Introduction, Material Handling systems, Material Handling principles, Classification of Material Handling Equipment, Relationship of material handling to plant layout

UNIT – VI
Basic Material Handling systems: Selection, Material Handling method- path, Equipment, function oriented systems

UNIT – VII
Methods to minimize cost of material handling- Maintenance of Material Handling Equipments, Safety in handling

UNIT – VIII
Ergonomics of Material Handling equipment. Design, Miscellaneous equipments

TEXT BOOKS:
1. Operations Management/ PB Mahapatra/PHI
2. Aspects of Material handling/ Dr. KC Arora & Shinde, Lakshmi Publications

REFERENCES:
1. Facility Layout & Location an analytical approach/ RL Francis/ LF Mc Linnis Jr, White/ PHI
2. Production and Operations Management/ R Panneerselvam/ PHI
3. Introduction to Material handling/ Ray, Siddhartha/ New Age
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RENEWABLE ENERGY SOURCES
(ELECTIVE - IV)

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

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

UNIT-III

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

UNIT-V

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

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

UNIT-VIII
DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and Joule-Thomson effects. Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday’s law’s, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:
1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy Sources /G.D. Rai

REFERENCES:
1. Renewable Energy Sources /Twidell & Weir
2. Solar Energy /Sukhatme
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa
UNIT-I

UNIT-II
Jet propulsion: Historical sketch-reaction principle – essential features of propulsion devices-Thermal Engines, Classification of – Energy flow thrust, Thrust power and propulsion efficiency-Need for Thermal Jet Engines and applications

UNIT-III
Turboprop and Turbojet-I: Thermo dynamic cycles, plant layout, essential components, principles of operation – performance evaluation

UNIT-IV
Turboprop and Turbojet-II: Thrust Augmentation and Thrust reversal-Contrasting with piston Engine Propeller plant.

UNIT-V

UNIT-VI
Rocket Engines: Need for, applications – Basic principles of operation and parameters of performances – classification, solid and liquid propellant rocket engines, advantages, domains of application – propellants – comparison of propulsion systems.

UNIT-VII

UNIT-VIII

TEXT BOOKS:

REFERENCE BOOKS:
1. Rocket propulsion – Sutton
2. Gas Turbines /Cohen, Rogers & Sarvna Muttoo/Addision Wesley & Longman.
3. Gas Turbines-V.Ganesan /TMH.
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 for instability, computational methods for error estimation, convergence of sequences.

UNIT - II

UNIT - III
Finite Difference Applications in Heat conduction and Convection – Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV

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

UNIT - VII
Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

UNIT-VIII

TEXT BOOKS:
2. Computational Fluid Flow and Heat Transfer/ Muralidaran- Narosa Publications

REFERENCES:
Unit-I
Introduction: Concept of continuum and control volume, continuity equation, momentum equation, streamline, steady, one dimensional dynamic equation of a fluid flow with and without friction, energy equation.

Unit-II

UNIT-III
Isentropic flow: Stagnation enthalpy, density, pressure and temperature, local acoustic speed. maximum speed, variation of Compressibility with mach number.

UNIT-IV
Variable area flow, criteria for acceleration and deceleration, critical condition, nozzle discharge co-efficient, nozzle efficiency, operation of nozzles under varying backpressures.

UNIT-V
Flow in constant area duct: Adiabatic and isothermal- flow calculation of pressure, temperature, density, Mach number relationships. Limiting length of duct for adiabatic and isothermal flow. Fanno line.

UNIT-VI
Diabatic flow: Flow of perfect gases in constant area duct with heat exchange, density temperature, pressure and mach number relationships. Limiting conditions.Rayleigh line.

UNIT-VII

UNIT-VIII
Shock intensity- Rayleigh- Pilot and Prandtl- Pitot equation for normal shock. Introduction to oblique shockwaves and hypersonic flow.

TEXT BOOKS
2. Zoeb Hussain, “Gas dynamics through problems “, WILEY EASTERN LTD.

REFERENCES
### Industry Oriented Mini Project

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### Seminar

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