ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

MECHANICAL ENGINEERING

for

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2015-2016)

College Code: C4

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)
Affiliated to Jawaharlal Nehru Technological University Hyderabad
Narasampet, Warangal – 506 332
Telangana State, India
1. **Award of B.Tech. Degree**
   A student will be declared eligible for the award of the B.Tech. Degree if he fulfills 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 192 credits and secure 186 credits with an exemption of 6 credits in elective subjects only.

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 unless extension is granted by College Academic Council (CAC) to complete the course for a further period.

2. **Courses of Study**

The following courses of study are offered at B.Tech level:

<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 &amp; Communication Engineering</td>
</tr>
<tr>
<td>05</td>
<td>Computer Sciences Engineering</td>
</tr>
</tbody>
</table>

3. **Credits**: All subjects/courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each subject/course in a L:T:P:C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) structure, based on the following table.

<table>
<thead>
<tr>
<th></th>
<th>For I-Year-I/II Semester</th>
<th>II,III,IV Years per Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Periods/Week</td>
<td>Credits</td>
</tr>
<tr>
<td>Lecture</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Tutorial</td>
<td>02</td>
<td>01</td>
</tr>
<tr>
<td>Practical</td>
<td>03</td>
<td>02</td>
</tr>
<tr>
<td>Drawing</td>
<td>02T &amp; 04D</td>
<td>04</td>
</tr>
<tr>
<td>Mini Project</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Comprehensive Viva</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Voce</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seminar</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Major Project</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4. Subject/Course Classification:
All the Subjects/Courses offered for the B.Tech are broadly classified as (a) Foundation Courses (FC), (b) Core Courses (CC) and (c) Elective Courses (EC).

i. Foundation Courses (FC) are further categorized as
   a. BSH (Basic Sciences, Humanities and Social Sciences),
   b. ES (Engineering Sciences).

ii. Core Courses (CC) and Elective Courses (EC) are categorized as PS (Professional Subjects), which are further subdivided as
   a. PC (Professional/Departmental Core) subjects,
   b. PE (Professional/Departmental Elective)
   c. OE (Open Electives)
   d. PW (Project Work)

iii. Minor Courses (1 or 2 Credit Courses, belonging to BSH/ES/PC as per relevance); and

iv. Mandatory Courses (MC-non-credit oriented).

4.1 Course Nomenclature: The Curriculum Nomenclature or Course-Structure Grouping for B.Tech programme is given below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Broad Course Classification</th>
<th>Course Group/ Category</th>
<th>Course Description</th>
<th>Range of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Foundation Courses (FC)</td>
<td>BSH-Basic Sciences, Humanities and Social Sciences</td>
<td>Includes Mathematics, Physics and Chemistry subjects and subjects related to Humanities, Social Sciences and Management</td>
<td>20%-30%</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>ES-Engineering Sciences</td>
<td>Includes Fundamental Engineering Subjects</td>
<td>15%-20%</td>
</tr>
<tr>
<td>3.</td>
<td>Core Courses (CC)</td>
<td>PC-Professional Core</td>
<td>Includes Core subjects related to Parent Discipline/ Department/ Branch of Engineering</td>
<td>35%-40%</td>
</tr>
<tr>
<td>4.</td>
<td>Elective Courses (EC)</td>
<td>PE-Professional Electives</td>
<td>Includes Elective subjects related to Parent Discipline/ Department/ Branch of Engineering</td>
<td>10%-15%</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>OE- Open Electives</td>
<td>Elective subjects which include interdisciplinary subjects or subjects in an area outside the Parent Discipline/ Department/ Branch of Engineering</td>
<td>5%-20%</td>
</tr>
<tr>
<td>6.</td>
<td>Core Courses</td>
<td>PW- Project Work</td>
<td>B.Tech Major Project Work</td>
<td>10%-15%</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>Mini Project</td>
<td>Industrial Oriented Training/ Internship/ Mini Project</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Seminar</td>
<td>Seminar based on Core contents related to Parent Discipline/ Department/ Branch of Engineering</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Minor Courses</td>
<td>One or two credit courses (subset of BSH)</td>
<td>Included</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Mandatory Courses (MC)</td>
<td>Mandatory Courses (Non-Credit)</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

Total credits for B.Tech. Programme 192 (100%)
5. **Course Registration**:

5.1 Each student, on admission shall be assigned to a Faculty Advisor/Counselor who shall advise her/him about the academic programmes and counsel on the choice of courses in consideration with the academic background and student’s career objectives.

5.2 Faculty advisor shall be only from the engineering departments. With the advice and consent of the Faculty Advisor the student shall register for a set of courses he/she plans to take up for each Semester.

5.3 The student should meet the criteria for prerequisites to become eligible to register for that course.

5.4 A student shall be permitted to register the prescribed credits per semester with a variation of ± 4 credits excluding Laboratories/Seminar/Project. However, registration for Repeat courses of previous semesters (Odd to Odd and Even to Even semesters) is allowed in excess of this limit.

5.5 If a student finds that he/she has registered for more courses than possible to study in a semester, he/she can drop one or more courses before the end of 3rd week of the semester.

5.6 A student is allowed to register for more than 192 credits in completion of B.Tech programme. However, additional credits scored shall not be considered for award of division and also not considered for calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). For such extra subject(s) registered a letter grade alone will be indicated in the Grade card as a performance measure.

6. **Subjects / Courses to be offered**:

6.1 Students shall have to register for the courses during the preparation and practical examinations of the previous semester. However for the first year, the students have to register for courses one week after the commencement of class work.

6.2 The maximum number of students to be registered in each course shall depend upon the physical facilities available.

6.3 The information on list of all the courses offered in every department specifying the credits, the prerequisites, a brief description of syllabus or list of topics and the time slot shall be made available to the student in time.

6.4 In any department, preference for registration shall be given to those students of that department for whom the course is a core course.

6.5 The registration for the inter departmental and/or open elective courses shall be on first come first served basis, provided the student fulfills prerequisites for that course, if any. The number of students to be registered shall be based on the class room and laboratory capacity. Every effort shall be made by the Department/Centre to accommodate as many students as possible.

6.6 More than one teacher may offer the same course in any semester.

6.7 No course shall be offered unless there is a minimum of 20 students or one third of the class strength specified.

7. **Programme Pattern**:

i. The entire course of study is of four academic years. All years shall be on semester pattern i.e two semesters per year. For each semester there shall be a minimum of 90 instruction days.

ii. A student is 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. There shall be no branch transfers after the completion of admission process.

8. Distribution and Weightage of Marks:

8.1 The Performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subjects. In addition, Industry oriented mini-project, Seminar, Comprehensive Viva-voce and Major Project Work shall be evaluated for 100, 100, 100 and 200 marks respectively.

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

8.3 For theory subjects, during the semester there shall be 2 mid-term examinations (internal exams) and two assignments carrying 5 marks each.

8.4 Each mid-term examination of 90 minutes consists of Part-A (objective type) for 10 marks and Part-B (subjective paper) for 15 marks. Mid-term examination paper shall contain 5 questions out of which the student has to answer 3 questions of each 5 marks. First mid-term examination shall be conducted for first 2.5 units (50%) of syllabus and second mid-term examination shall be conducted for remaining 2.5 units (50%) of syllabus. Objective type may be with multiple choice questions, true/false, match type questions, fill in the blanks etc.

8.5 First Assignment should be submitted before the conduct of the first mid-term examination and the second Assignment should be submitted before the conduct of the second mid-term examination. The assignments shall be as specified by the concerned subject teacher.

8.6 The first mid-term examination marks and first assignment marks make first set of internal evaluation and second mid-term examination marks and second assignment marks make second set of internal evaluation marks, and the better of these two sets of marks shall be taken as the final mid-term marks secured by the student towards internal evaluation in that theory subject.

8.7 If a student is absent for any test/assignment, he is awarded zero marks for that test/assignment. However a candidate may be permitted on genuine grounds provided he has taken permission before the mid-term examinations from the Head of the Department. Moreover he has to apply for makeup examinations within a week after completion of mid-term examinations. A subcommittee will be constituted by the College Academic Council to look into such cases. The subcommittee constituted by the College Academic Council may conduct improvement for the internal examinations for theory subjects for the interested candidates.

8.8 The details of the Question Paper pattern for theory examination is as follows:

(i) The end semesters exam will be conducted for 70 Marks which consist of two parts viz. Part-A for 20 Marks and Part-B for 50 Marks.

(ii) Part-A is compulsory question which consist of 5 Sub-questions, one from each unit, carrying 4 Marks each.

(iii) Part-B consist of 5 questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions, there will be an either or choice (i.e. There will be two questions from each unit and student will answer any one question).

8.9 For practical subjects there shall be a continuous internal evaluation during the semester for 30 sessional marks and 70 end examination marks. Out of the 30 sessional marks, day-to-day work in the laboratory shall be evaluated for 20 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 one external examiner and one internal examiner. The external examiner shall be appointed from the panel of examiners as recommended by the Board of Studies in respective Branches.

8.10 For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day-to-day work and 10 marks for internal test) and 70 marks for end examination.

8.11 There shall be a mini project preferably suggested by the 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 in IV Year I-Semester. The mini project shall be submitted in a report form and should be presented before the committee, which shall be evaluated for 100 marks. The committee consists of an External Examiner, Head of the Department, Supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for mini project.

8.12 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 and presentation shall be evaluated for 100 marks. There shall be no external examination for seminar.

8.13 There shall be 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 student’s understanding in various subjects he/she studied during the B.Tech Programme. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

8.14 Out of a total of 200 marks for the major project work, 60 marks shall be for internal evaluation and 140 marks for the end semester examination. The end semester examination (Viva-Voce) shall be conducted by a committee. The committee consists of an External Examiner, Head of the Department and the Project Supervisor. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his major project.

8.15 The topics for industry oriented mini project, seminar and major project work shall be different from each other.

9. Attendance Requirements:

9.1 A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of aggregate attendance in all the subjects.

9.2 Condonation of shortage of attendance in each subject up to 10% on genuine grounds in each semester may be granted by the College Academic Council on recommendation by the Principal.

9.3 Shortage of attendance below 65% shall in no case be condoned.

9.4 Student falling short of attendance as specified above will be detained.

9.5 A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek-re-admission for that semester when offered next. They may seek re-registration for all those subjects registered in that semester in which he got detained, by seeking re-admission for that semester as and when offered; in case there are any professional electives and/or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective subjects offered under that category. A stipulated fee decided by the College Academic Council shall be payable towards condonation of shortage of attendance.

10. Minimum Academic Requirements:

The following academic requirements have to be fulfilled in addition to the attendance
requirements mentioned in item no.09.

10.1 A student shall be deemed to have fulfilled the minimum academic requirements and earned the credits allotted to each theory or practical or 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.

10.2 A student shall be promoted from I Year to II Year unless he fulfills the minimum academic requirements of 24 credits out of 48 credits of I Year from all examinations and secures prescribed minimum attendance in I Year.

10.3 A student shall be promoted from II Year to III year only if he fulfills the academic requirement of 36 credits out of 72 credits from one regular and one supplementary examinations of I Year and one regular and one supplementary examination of II year I semester irrespective of whether or not the candidate takes the examination and secures prescribed minimum attendance in II Year II Semester.

10.4 A student shall be promoted from III year to IV year only if he fulfills the academic requirements of 60 credits out of 120 credits secured from all the examinations both regular and supplementary conducted up to end of III Year I semester irrespective of whether or not the candidate takes the examination and secures prescribed minimum attendance in III Year II Semester

a) Two regular and two supplementary examinations of I Year
b) Two regular and two supplementary examinations of II Year I semester

c) Two regular and one supplementary examinations of II Year II Semester.

d) One regular and one supplementary examination of III Year I semester.

10.5 A student should earn all credits with an exemption of 6 credits in elective subjects. The marks obtained in the subjects excluding the subjects exempted shall be considered for the final calculation of CGPA and SGPA.

10.6 Student who fails to earn credits with an exemption of 6 credits as indicated in the Programme structure within 8 academic years from the year of admission Shall forfeit his seat in B.Tech. Programme unless an extension is given by College Academic Council to complete the Programme for a further period of 2Years.

10.7 A student shall register for all subjects covering 192 credits as specified and listed (with the relevant course/subjects classifications as mentioned) in the course structure, put up all the attendance and academic requirements and securing a minimum of P Grade (Pass Grade) or above in each subject, and earn 186 credits securing Semester Grade Point Average (SGPA)≥4.5 in each semester, and Cumulative Grade Point Average (CGPA) ≥ 4.5 at the end of each successive semester, to successfully complete the B.Tech Programme.

10.8 When a student is detained due to shortage of attendance in any semester, he may be re-admitted into that semester, as and when offered, with the Academic Regulations of the batch into which he gets readmitted. However, no grade allotments of SGPA/CGPA calculations will be done for that entire semester in which he got detained.

10.9 When a student is detained due to lack of credits in any year, he may be readmitted in the next year, after fulfillment of the academic requirements, with the academic regulations of the batch into which he gets readmitted.
10.10 A student is eligible to appear in the end semester examination in any subject/course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject/course at the supplementary examinations as and when conducted. In such cases, his internal marks assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the supplementary examination, for evaluating his performance in that subject.

11. Grading Procedure
11.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals or Seminar or Project or Mini-Project, Minor Course etc., based on the % of marks obtained in End examination, both taken together as specified in item no. 07 above and a corresponding Letter Grade shall be given.

11.2 As a measure of the student’s performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

Grades and Grade Points

<table>
<thead>
<tr>
<th>% of Marks obtained in a course</th>
<th>Letter Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=80 to 100</td>
<td>OS (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>&gt;= 70 to &lt;80</td>
<td>A+ (Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>&gt;= 60 to &lt;70</td>
<td>A (Very Good)</td>
<td>8</td>
</tr>
<tr>
<td>&gt;= 55 to &lt;60</td>
<td>B+ (Good)</td>
<td>7</td>
</tr>
<tr>
<td>&gt;= 50 to &lt;55</td>
<td>B (Above Average)</td>
<td>6</td>
</tr>
<tr>
<td>&gt;= 45 to &lt;50</td>
<td>C (Average)</td>
<td>5</td>
</tr>
<tr>
<td>&gt;= 40 to &lt;45</td>
<td>P (Pass)</td>
<td>4</td>
</tr>
<tr>
<td>Less than 40</td>
<td>F (Fail)</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>Ab (Absent)</td>
<td>0</td>
</tr>
</tbody>
</table>

11.3 A student obtaining ‘F’ Grade in any subject shall be considered ‘failed’ and will be required to reappear as ‘Supplementary Candidate’ in the End Semester Examination, as and when offered. In such cases, his Internal Marks in those Subject(s) will remain same as those he obtained earlier.

11.4 A Letter Grade does not imply any specific % of Marks.

11.5 In general, a student shall not be permitted to repeat any Subject/Course(s) only for the sake of ‘Grade Improvement’ or ‘SGPA/CGPA Improvement’. However, he has to repeat all the Subjects/Courses pertaining to the Semester, when he is detained (as listed in Item No. 10.8-10.9).

11.6 A student earns Grade Point (G.P.) in each Subject/Course, on the basis of the Letter grade obtained by him in that Subject/Course (excluding Mandatory non-credit Courses). Then the corresponding ‘Credit Points’(C.P.) are computed by multiplying the Grade Point with Credit Points (C.P.) for that particular Subject/Course.

\[ \text{Credit points (C.P.)} = \text{Grade Points (G.P.) X Credits} \ldots \ldots \text{For a Course} \]

11.7 The student passes the Subject/Course only when he gets G.P≥4 (P Grade above).

11.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣC.P.) Secured from All Subjects/Courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to Two Decimal Places. SGPA is thus computed as
For each semester

\[ \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{i=1}^{N} C_i} \]  

Where “i” is the subject indicator index (taken into account all subjects in a semester), ‘N’ is the number of subjects ‘REGISTERED’ for the Semester (as specifically required and listed under the Course Structure of the parent Department), and Ci is the number of Credits allotted to the ith subject and Gi is represents the Grade Points (G.P.) corresponding to the Letter Grade awarded for that ith Subject.

11.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in all registered Courses (with an exemption of 6 credits in electives subjects) in all semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the 1st year, Second-Semester onwards, at the end of each semester, as per the formula.

\[ \frac{\sum_{j=1}^{M} C_j G_j}{\sum_{j=1}^{M} C_j} \]

…for all ‘S’ semesters registered (i.e., upto and inclusive of ‘S’ semester, S≥2)
Where “M” is the total no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the student has ‘REGISTERED’ from the 1st Semester onwards upto and inclusive of the semester S (obviously M>N), ‘j’ is the subject indicator index takes into account all subjects from 1 Subject and Gi represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth subject. After registration and completion of I year I semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

11.10 For Merit Ranking or Comparison purpose or any other listing only the rounded off values CGPAs will be used.

11.11 For calculation listed in item no.11.6-11.10, performance in failed Subjects/Courses (Securing F Grade) will also be taken into account and the credits of such Subjects/Courses will also be included in the multiplications and summations.

12. Passing Standards:

12.1 A student shall be declared successful or ‘passed’ in a Semester only when he gets a SGPA≥4.5 (at the end of that particular Semester); and a student shall be declared successful or ‘passed’ in the B.Tech Programme, only when he gets a CGPA≥4.5; subject to the condition that he secures a GP≥4 (P Grade or above) in every registered Subject/Course in each Semester (during the B.Tech Programme) for the Degree Award, as required.

12.2. In spite of securing P Grade or above in some (or all) Subjects/Courses in any Semester, if a Student receives a SGPA<4.5 and/or CGPA<4.5 at the end of such a Semester, then he may be allowed on the following specific recommendations of the Head of the Department and subsequent approval from the Principal.

i.) To go into the next subsequent Semester (Subject to fulfilling all other attendance and academic requirements as listed under items no.9-10);
ii.) To ‘improve his SGPA of such a Semester (and hence CGPA to 4.5 or above’, by reappearing for one or more as per student’s choice or the same subject(s)/courses(s) in which he has secured P Grade(s) in that semester, at the supplementary examinations to be held in the next subsequent semester(s).

In such cases, his internal marks in those subject(s) will remain same as those he obtained earlier. The newly secured letter grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

12.3. A Student shall be declared successful or ‘passed’ in any Mandatory (non-credit) Subject/Course, if he secures a ‘Satisfactory Participation Certificate’ for that course.

12.4 After the Completion of each semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the Registered Students of that Semester, indicating the Letter Grades and Credits earned. It will show the details of the Courses Registered (Course Code, Title, Number of Credits, Grade earned etc.), credits earned, SGPA and CGPA.

13. Declaration of Results:

13.1 Computation of SGPA and CGPA are done using the procedure listed in item no.11.6 – 11.10.

13.2 For Final % of Marks equivalent to the computed final CGPA, the following formula may be used:

\[
\% \text{ of Marks} = (\text{Final CGPA} - 0.5) \times 10
\]

14. Award of Degree under CBCS:

14.1 A student will be declared eligible for the award of the B.Tech. Degree if he fulfills 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 192 credits and secure 186 credits with an exemption of 6 credits in elective subjects only.

iii. Secures Cumulative Grade Point Average (CGPA) \(\geq 4.5\).

iv. 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 unless extension is granted for a further period by College Academic Council (CAC) to complete the course.

14.2 A student who qualifies for the Award of the Degree as per item 13.2 shall be placed in the following classes.

**Award of Division:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Division</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Class with Distinction</td>
<td>(\geq 7.5)</td>
</tr>
<tr>
<td>2</td>
<td>First Class</td>
<td>(\geq 6.5) but less than 7.5</td>
</tr>
<tr>
<td>3</td>
<td>Second Class</td>
<td>(\geq 5.5) but less than 6.5</td>
</tr>
<tr>
<td>4</td>
<td>Pass Class</td>
<td>(\geq 4.5) but less than 5.5</td>
</tr>
</tbody>
</table>

14.3 A student with final CGPA (at the end of the Course) < 4.5 will not be eligible for the Award of the Degree.
15. Withholding of Results:

If the student has not paid fees to University/College at any stage or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he will not be allowed to go into the next higher semester. The Award or issue of the Degree may also be withheld in such cases.

16. Transitory Regulations:

Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subject/course (or equivalent subjects/courses, as the case may be), and same Professional Electives/Open Electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of his I year I Semester).

Details of Transitory regulations:

B.Tech (R15) CBCS program approved under Item No: 16 of Academic Regulations.

Admission with advance standing: These may arise in the following cases:

1. When a student seeks transfer from other college to Jayamukhi Institute of Technological Sciences (JITS) and desires to pursue study at JITS in an eligible branch of study.

2. When students of JITS get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.

3. When as student after long discontinuity rejoins the college to complete his Programme of study for the award of a degree.

4. When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Programme of study. These admissions may be permitted by the Academic Council of JITS as per the norms stipulated by the statutory bodies and the Govt. of Telangana. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at JITS will be governed by the transitory regulations given below.

I. Transitory Regulations: For students admitted under advance standing, these transitory regulations will provide the modus operandi. At the time of such admission, based on the Programme pursued (case by case)

1. Equivalent courses completed by the student are established by the Chairman, BOS concerned.

2. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme study prescribed by JITS.

3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuing at JITS.

4. Marks obtained in the previous system if the case be, are converted to grades and accordingly CGPA is calculated. All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is merged.

5. The students those who are on rolls to be provided one chance to write the internal exams in the subjects not studied, as per the clearance letter (equivalence) issued by Chairman, BOS.

6. After the revision of the regulations, the students of the previous batches will be given two
subsequent chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

II. Transitory Regulations for the students who have discontinued the programme:

1) Student who has discontinued for any reason, or has been detained for want of attendance

Or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subject/course (or equivalent subjects/courses, as the case may be),

2) The student is permitted to register for Professional Electives/Open Electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of his I year I Semester).

Scope:

1. The academic regulations should be read as a whole, for the purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
3. JITS may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date of notified.

17. General:

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

ii. Where the words “subject” or “subjects”, occur in these regulations, they also imply “course” or “courses”.

iii. The academic regulations should be read as a whole for the purpose of any interpretation.

iv. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, College Academic Council is final.

Note: The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College Authorities.

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

_Effective for the students getting admitted into II-Year from the academic year 2016-2017 and onwards_

1. The students have to acquire all credits (Total 144) from II to IV year of B.Tech. Program (Regular) for the award of the degree. Register all credits and secure all credits with the exemption of 6 credits in elective subjects.

2. Student, who fails to fulfill the requirements for the award of the degree in six consecutive academic years from the year of admission, shall forfeit his seat unless extension is granted by the College Academic Council to complete the Programme for a further period.

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

4. **Promotion Rule:**
   
i. A Student shall be promoted from II Year to III Year if he fulfills the minimum academic requirements of 24 credits of out of 48 credits of II Year from all examinations and secures prescribed minimum attendance in II Year.

   ii. A student shall be promoted from III year to IV year only if he fulfills the academic requirements of 36 credits out of 72 credits secured from the following examinations, whether the candidate takes the examination or not, and secure prescribed minimum attendance in III Year II Semester.
      
      a) Two regular and Two Supplementary examinations of II Year I Semester
      b) Two regular and one supplementary examinations of II Year II Semester.
      c) One regular and one supplementary examination of III Year I Semester.

5. All other regulations as applicable for B.Tech. IV year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)

*Note: The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College Authorities.*

***
**MALPRACTICES RULES**  
**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper Conduct</th>
<th>Punishment</th>
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<tr>
<td><strong>If the candidate:</strong></td>
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<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>
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<tr>
<td>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester. The Hall Ticket of the candidate is to be cancelled.</td>
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<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</td>
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</tr>
<tr>
<td>4.</td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</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>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</td>
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<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
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<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
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<td>9.</td>
<td>If student of the college, who is not a candidate for the particular examination</td>
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<tr>
<td>or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
<td>performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
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<tr>
<td>10. Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.</td>
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<tr>
<td>11. Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
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<td>12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be referred to Examination Result Processing Committee (ERPC) further action to award suitable Punishment.</td>
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***
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

### I YEAR– I SEMESTER

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# COURSE STRUCTURE

(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

## II YEAR – I SEMESTER

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## II YEAR – II SEMESTER

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### II YEAR – II SEMESTER

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# MECHINICAL ENGINEERING

## COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

### IV YEAR - I SEMESTER

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# LIST OF OPEN ELECTIVES (COLLEGE LEVEL)

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**Department of EEE**

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<td>AJ5221</td>
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**Department of CSE**

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**Department of ME**

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**Department of CE**

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**Note:** ‘_’ represents the subject code with semester of the respective B.Tech branch

Note: The syllabus of Open electives is given separately in the Annexure
B.TECH
I YEAR
I & II SEMESTER
SYLLABUS
Course Objective:

The main aim of teaching Engineering Mathematics-I is to emphasize the relevance of fundamentals and applications of Mathematics in Engineering field. Mathematics is the basic of all branches of modern business and science and technology. It deals with using the constructive results of mathematics to solve a problem in applied science or Engineering field.

It helps the students in choosing a technique that improve the quality and efficiency of actual computation.

UNIT–I:

Ordinary differential equations of first order:

UNIT–II:

Ordinary linear differential equations of higher order:
Homogenous, Non Homogenous linear differential equations of higher order of the form $e^{ax}$, Sinax, Cosax, Polynomials in x, $e^{ax}v(x)$, $x^k v(x)$, Method of variation of parameters.

UNIT – III:

Differential calculus:
Rolle's Mean Value theorem, Lagrange’s Mean Value Theorem, Cauchy’s Mean Value Theorem, Taylor’s Theorem (without proof). Jacobian, Maxima and Minima of functions of two variables.

UNIT – IV:

Improper integration and multiple integrals:
Multiple integrals - Double & Triple integrals. Change of variables and Change of order of integration.

UNIT – V:

Laplace Transformation:
Laplace transform - Inverse Laplace transform - properties of Laplace transforms - Laplace transforms of unit step function, impulse function & periodic function, convolution theorem (without proof), applications of ordinary differential equations.
Learning Outcomes:

1. By learning the first order differential equations student can able to find the solutions of many applications in engineering field.
2. By studying the higher order differential equation many of the transcendental equations are solvable very easily.
3. By studying the mean value theorems student can find roots of the algebraic and transcendental equations.
4. By studying the applications of integration the student able to study find area, surface and volume of a revolution.
5. The students understand how to find the solution of initial and boundary value problem without finding general solution by Laplace technique.

Recommended Text Books:


Reference Book:

****
I-Year B.Tech. I Semester MECH, EEE, ECE & CIVIL

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 competencies 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. Hence, it is suggested that they read it on their own the 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, fostering ideas and practice of language skills.

Course Objectives:
To improve the language proficiency of the students in English with emphasis on LSRW skills.
To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
To develop the study skills and communication skills in formal and informal situations.

SYLLABUS:
Listening Skills:

Objectives
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
To equip students with necessary training in listening so that they 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 six units of the prescribed text: *Skills Annexe: Functional English for Success.*)
   - Just A Minute(JAM) Sessions.

Reading Skills:

Objectives
To develop an awareness in the students about the significance of silent reading and comprehension.
   - 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

Scanning
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 authentic texts, such as magazines/newspaper articles.*

Writing Skills:

Objectives:
To develop an awareness in the students about writing as an exact and formal skill
   - 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
Describing graphs using expressions of comparison
TEXTBOOKS PRESCRIBED:
For Detailed study
First Textbook entitled “Skills Annexe -Functional English for Success”, Published by Orient Black Swan, Hyderabad
The course content and study material is divided into Five Units.

Unit – I:
Importance of communication in English-Globalisation-changing trends-barriers to communication

Unit –II:
Chapter entitled ‘Wit and Humour’ from ‘Skills Annexe’ -Functional English to Success
Published by Orient Black Swan, Hyderabad
Chapter entitled ‘Mokshagundam Visvesvaraya’ from “Epitome of Wisdom”,
Published by Maruthi Publications, Hyderabad.

and

G-TYPES OF NOUNS AND PRONOUNS
V- Homonyms, homophones synonyms, antonyms

Unit –III
Chapter entitled “Advances in Science and Technology” from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad.
Chapter entitled ‘Three days To See’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad.

and

G- Verb forms
V- Noun, verb, adjective and adverb

Unit –IV
Chapter entitled ‘Risk Management’ from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad.
Chapter entitled ‘Leela’s Friend’ by R.K. Narayan from “Epitome of Wisdom”,
Published by Maruthi Publications, Hyderabad.

and

G – Present tense
V – Synonyms and Antonyms

Unit –V
Chapter entitled ‘Human Values and Professional Ethics’ from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad.
Chapter entitled ‘The Last Leaf’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad.

and

G- Past and future tenses
V- Vocabulary - idioms and Phrasal verbs

* Exercises from the texts not prescribed shall also be used for classroom tasks.
Course Outcomes

Usage of correct English Language, written and spoken
Enrichment of comprehension and fluency
Gaining confidence in using language in varied situations

Suggested Reading:
7. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
10. Technical Communication, Meenakshi Raman, Oxford University Press
11. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
13. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
15. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
17. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan, Frank Bros & CO
19. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
22. Examine Your English – Margaret Maison.

****
Course Objectives:

The purpose of these courses is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering. Thus, the courses have been conceived in such a way that they take into account appropriate combinations of old and new emerging concepts in the chemical sciences area and their current and potential uses in engineering. The Courses attempt to address the principles of general chemistry and specific topics relevant to various engineering disciplines, wherein the students can apply this learning in their respective areas of expertise.

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of their profession and that therefore they must have a good understanding of chemistry before they can use it in their profession.

UNIT–1: Electro Chemistry
Ohm’s law, conductance, specific, equivalent and molar conductance, units and their relation. Numerical Problems. EMF: Electrochemical and Electrolytic cells, Galvanic cell, Electro chemical series, measurement of emf and single electrode potential, Nernst’s equation and its applications,

UNIT–2: Electrodes and Battery Chemistry

UNIT–3: Corrosion and Its control
Introduction, Causes of corrosion, Types of corrosion- Dry and Wet corrosion (Galvanic & concentration). Factors affecting on corrosion, Corrosion controlling methods- Cathodic protection and Surface coatings (anodic and Cathodic), Methods of applications of metal coatings- Hot dipping and electroplating.

UNIT–4: Polymer Chemistry
Introduction, Functionality of Monomers, classification of polymers, Types of polymerization, Mechanism of polymerization: Chain and step. Plastics: Chemistry of Thermoplastic resins (PE, PVC & PS) and thermosetting resins (Nylon & Bakelite).

UNIT – 5:

Water Chemistry

Course Outcomes:

- Applications of electrochemistry understanding different types of cells, their representation, knowledge of electrode potentials, utilization of electrical energy and its conversation into different energies.
- Applicability of electrodes in different fields of analysis.
- Understanding the utility of batteries as a source of energy in many electronic gadgets & their types.
- Enhancement of power generation by making of fuel cells. Knowledge of need for alternate source of energy.
- Deterioration of metal under the influence of environment, Mechanism of corrosion, Factors affecting corrosion, Prevention of corrosion using various methods & A basic knowledge of surface coatings.
- Improving the properties of plastics by various additives, Integral role of various polymers in our life style & Applicability of plastic in automobile and textile industry.
- Knowledge of hardness of water and its effects, Industrial utility of water especially for steam generation, Removal Methodologies of hardness.

Text Books:
2. Text Book of Engineering Chemistry by Y. Bharathi kumari and Jyotsna Cherikuri, VGS Publications.
3. Text Book of Engineering Chemistry by Shashi Chawla

Reference Books:
1. Elementary principles of Physical Chemistry by P.W. Atkins, Oxford University Press.
2. Physical Chemistry by Puri & Sharma
3. Engineering Chemistry by Jain & Jain
5. Polymer Chemistry by Gourikar.
6. Physical Chemistry Glastone.

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COURSE OBJECTIVES:
1. Understand the basic principles of static’s applicable to rigid bodies in equilibrium
2. Apply static principles to the solution of a variety of practical problems.
3. Determine the centre of gravity of Simple figures, composite figures and its applications
4. Determine the Moment of inertia of Simple figures, composite figures and its applications
5. Determine mass moment of inertia of simple objects, composite bodies.
6. Determine the Frictional Forces when the bodies are under motion.

UNIT – I
Introduction to Engineering Mechanics – Basic Concepts.

UNIT – II

UNIT – III

UNIT – IV
CENTROIDS AND CENTERS OF GRAVITY: Introduction – Centroid and Centre of gravity of simple figures (from basic principles) – Centroid of Composite Figures – Center of gravity of bodies and centroid of volumes.

UNIT – V
Moments of Inertia : Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas - Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia : Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - mass moment of inertia of composite bodies.
TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
The students will be able to
1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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COURSE OBJECTIVES:
1. Use various engineering drawing instruments.
2. Learn the basic conventions of drawings, dimensioning, scales and conic sections like ellipse, parabola and hyperbola.
3. Learn projections of points, lines viewed in different positions
4. Learn projections of plane surfaces and solids viewed in different positions.
5. Gain knowledge of sections of solids and their usage in real time applications.

UNIT - I

Curves: Constructions of Curves used in Engineering Practice:
   a) Conic Sections – General method only.
   b) Cycloid. Epicycloid and Hypocycloid
   c) Involute
   d) Scales: Constructions of different types of Scales, Plain, Diagonal, Vernier scale.

UNIT - II

ORTHOGRAPHIC PROJECTIONS IN FIRST ANGLE PROJECTION: Principles of Orthographic Projections – Conventions – First and Third Angle. Projections of points
PROJECTIONS OF LINES: Parallel, Perpendicular inclined to one plane and inclined to both planes. True lengths. traces.

UNIT - III

PROJECTIONS OF PLANES: Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of regular solids. Cube, prisms, pyramids, tetrahedron, cylinder, Cylinder and cone, axis inclined to both planes.

UNIT – V

TEXT BOOKS

1. Engineering Drawing – Besant, Agrawal, TMH
2. Engineering Drawing. N.D.Bhatt

REFERENCES:

2. Engineering drawing – P.J.Shan S.Chand Publisher.

****
I Year  B.Tech. I-Sem: Mech & Civil  

Objectives:
To provide the necessary knowledge and training for step by step computer program development and to present the basic concepts in C programming language and to prepare the students to write modular and readable C Programs

Syllabus Content

UNIT-1


Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

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

UNIT-2

Designing Structured Programs: 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 programs

Arrays: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT-3

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.

UNIT-4

Strings: Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.
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-5


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 program examples.

Text Books:
1. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

References:
1. C Programming & Data Structures, E.Balagurusamy, TMH.
5. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Course Outcomes:
CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:
1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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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.

**Course Objectives:**
- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

**Syllabus:**

**English Language Communication Skills Lab shall have two parts:**

**a. Computer Assisted Language Learning (CALL) Lab**

**b. Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**

**Exercise-I**
**CALL Lab:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants
**ICS Lab:** Ice-Breaking Activity and JAM Sessions
Intensive Practice in Articles, Prepositions, Word Formation- Prefixes & Suffixes, Synonyms & Antonyms with Software/Handouts

**Exercise-II**
**CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
Concord (Subject in agreement with verb) and Words Often Misspelt- Confused/Misused

**Exercise-III**
**CALL Lab:** Minimal Pairs- Word Accent and Stress Shifts- Listening Comprehension.
**ICS Lab:** Descriptions- Narrations- Giving Directions and Guidelines.
Sequence of Tenses, Question Tags and One Word Substitutes.
Exercise-IV
CALL Lab: Intonation and Common Errors in Pronunciation. ICS Lab: Extempore- Public Speaking
Active and Passive Voice –Common Errors in English, Idioms and Phrases

Exercise-V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice ICS Lab: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume Preparation.

Course Outcomes:
Better Understanding of nuances of language through audio- visual experience and group activities
Neutralization of accent for intelligibility
Speaking with clarity and confidence thereby enhancing employability skills of the students

Minimum Requirement of Infrastructural Facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:
The Computer Aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.
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

2. Interactive Communication Skills (ICS) Lab:
The Interactive Communication Skills Lab: A spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system, camcorder etc.
   In addition to the prescribed lab manual, all the listening and speaking activities mentioned in Text-1 and Text-2 can be conducted in the English Language Communication Skills Lab.

Suggested Software:
Macmillan Dictionary Modern English (with CD).
Oxford Advanced Learners’ Dictionary (with CD).
Cambridge Advanced Learners’ English Dictionary with CD. Grammar Made Easy by Darling Kindersley
Punctuation Made Easy by Darling Kindersley
Clarity Pronunciation Power – Part I
Clarity Pronunciation Power – part II
Oxford Advanced Learner’s Compass, 8th Edition

*DELTAS 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)

*English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy,*
Cambridge

Raman, M & Sharma, S. 2011. Technical Communication, OUP

**Suggested Reading:**

1. Situational Engish, Prof. Damodar 33 situations BIE Publications (with CD)
2. Radio lessons, Prof. G. Damodar.
   New Delhi: Foundation
   Macmillan Publishers India Ltd. Delhi.
6. Sasi Kumar, V & Dharmiya, P.V. *How to Prepare for Group Discussion and Interviews.*
   Tata McGraw Hill
    New Delhi : Foundation
13. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
15. *A Textbook of English Phonetics for Indian Students* by T.Balasubramanian (Macmillan)
16. *Topical Thoughts – (A Textbook of Reading and Writing Skills)* Dr. P. Satyanarayana,

**DISTRIBUTION AND WEIGHTAGE OF MARKS**

*English Language Laboratory Practical Examination:*

The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

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 the teacher concerned with the help of another member of the staff of the same department of the same institution.
Objectives:
To provide the necessary knowledge and practical training for step by step computer program development and to apply the basic concepts in C programming language and to train the students to write modular and readable C Programs.

Syllabus Content

1.a Write a C program to find the sum of individual digits of a positive integer.
1.b 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.
1.c Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
2.a Write a C program to find the roots of a quadratic equation.
2.b Write a C program to find the factorial of a given integer.
2.c Write a C program to find the GCD (greatest common divisor) of two given integers.
3.a Write a C program to solve Towers of Hanoi problem.
3.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)
3.c Write a C program to find both the largest and smallest number in a list of integers.
4. Write a C program that uses functions to perform all of the following:
   i. Reading of a matrix.
   ii. Printing a matrix in a formatted form.
   iii. Adding two compatible matrices to produce a result matrix
   iv. Multiplying two compatible matrices to produce a result matrix.
5. 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.
   iii. Write a C program to determine if the given string is a palindrome or not.
6.a Write a C program using pointer to create a two dimensional matrix, to input values in to the matrix and to display the matrix and its transpose. Free the memory properly.

6.b Write a C program to demonstrate calling of a function (like add, subtract, multiply) using a function pointer.

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.

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

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

8.b Write a C program to construct a pyramid of numbers.

9. Write a menu driven C program that uses functions to perform the following operations on complex numbers stored in a structure:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers

10. 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

11. Write a C program that implements the merge sort method to sort a given list of integers in ascending order.

12. Write a C program that implements the quick sort method to sort a given list of integers in ascending order.

13. 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

14.a Write a C program which copies one text file to another text file and verify the correctness.

14.b Write a C program which copies one binary file to another binary file and verify the correctness.

15.a Write a command-line C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

15.b Write a C program to display the contents of a file.

16.a Write a C program to produce reverse of the content of a text file into another text file and verify the result.

16.b Write a C program to merge two text files into a third text file (i.e., the contents of the first file followed by those of the second are put in the third file) and verify the correctness.
**Text Books:**

**References:**
3. *C Programming & Data Structures*, E.Balagurusamy, TMH.
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

**Course Outcomes:**

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.

CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.

CO-4: A recognition of the need for, and an ability to engage in life-long learning.

**Learning Outcomes:**

1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.

****
Course Objective:

The main aim of this subject is to improve the mathematical knowledge of the student. When the student study the mathematics-II he should get the impression that mathematics is a systematic science of practical importance, resting on a relatively small number of basic concepts and involving powerful unifying methods. He should soon convince himself of the necessity for applying mathematical procedures to engineering problem.

By studying the mathematics the students translating the given physical information into mathematical model. This model may be a differential equation, a system of equation or some other mathematical expression.

Unit-I :

Solution of Linear System:

Matrix and types of Matrices Elementary row and column operations on a matrix, Rank of matrix –Echelon and Normal form, Linear dependence and independence of vectors, solutions of systems of linear equations using elementary operations.

Unit-II:

Eigen values and Eigen vectors:


Unit – III:

Fourier series:

Determination of Fourier Coefficients, Even and Odd functions, Half Range Fourier Sine and Cosine expansions Fourier series in an arbitrary interval.

Unit - IV:

Vector Calculus:

Scalar and Vector fields; directional derivatives - Gradient of scalar field, Divergence and Curl of a vector field -Vector integration: Green’s theorem, Gauss Divergence theorem, Stoke’s theorem (without proof).
Unit – V:

**Partial differential equation:**


**Learning Outcomes:**
1. The student learns about the rank of the matrix and solving of system of simultaneous linear equations.
2. The student learns about how to find the eigen values and eigen vectors of different engineering fields and they use concept of matrices in the development of programming languages.
3. By studying the Fourier series & Fourier transforms students are able to solve the problem related to theory of circuits and many applications in electronics engineering and communication engineering.
4. The concept of vector integrations (Green’s, Gauss & Stoke’s theorems), students are able to convert double integration into line integrations and triple integrations.
5. By studying the partial differential equation students are able to solve the many applications of mechanical and civil Engineering.

**Recommended Text Books:**

**Reference Book:**

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Objectives:

- Physics is the mother of engineering and technology. Without the applications of concepts of physics there can be no technological developments. Hence physics is the foundation on which stands the elaborate structure of technology. The main purpose of teaching physics to engineering under graduates is to acquaint the budding engineers with a thread of development. The aim of Physics is to provide an adequate exposure and develop insight about the basic principles of physics along with the engineering applications. The acquaintance of basic physics principles would help the engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

UNIT-I:

Crystallography, Crystal Structures & Band Theory of Solids:


Band theory of solids: Schrodinger time independent wave equation and significance of wave function. Electrons in a periodic potential, Bloch theorem, Kronig-Penny model (Qualitative treatment), E-k curve, Origin of band formation in solids, Classification of materials into conductors, semi conductors and insulators.

UNIT-II:

Semi-conductor Physics & Semi-conductor Devices.

Semi-conductor Physics: density of energy states, Calculation of carrier concentration in intrinsic semiconductors and extrinsic semi conductors (N-type), Direct and Indirect band gap semi conductors, Hall effect & its applications.
Semi-conductor devices: Energy diagram of P-N diode, I-V characteristics of P-N junction diode, LED, photo diode & solar cell.

UNIT-III:

Dielectrics & Magnetic Materials


UNIT-IV:

Lasers & Fibre Optics


Fibre Optics: Acceptance angle and acceptance cone, Numerical aperture, Step index and graded index fibres, Applications of optical fibres in communication systems.

UNIT-V:

Super-conductivity & Nano Science

Super-conductivity: Zero resistance, Critical temperature, Perfect dia-magnetism, Meissner effect, Critical field (Hc), BCS theory (qualitative treatment), Type-I & Type-II superconductors, Magnetic Levitation Applications.

Nano Science: Nano scale, Surface to volume ratio, Quantum confinement, Top-down method: Bottom-up fabrication, sol-gel method, chemical vapour deposition method, Characterization by SEM & TEM (principles)-Applications in medicine, engineering & science.

Outcomes:

1. The student learns about crystalline materials and their structures.
2. The student learns about classification of solids by band theory.
3. The student learns how to calculate number of charge carriers in a semi conductor.
4. The student learns about fabrication of semi conductors into devices.
5. The student learns about dielectrics and magnetic materials along with their engineering applications.
6. The student learns about lasers, their construction and applications in engineering field.
7. The student learns about super conductors, classifications and their applications.
8. The student learns about nano materials and their fabrication methods along with their characterisation by XRD & SEM.

Text Books:
1. Engineering Physics, P.K Palanisamy, Scitech Publications

Reference Books:
7. Engineering Physics, D.K. Bhattacharya, Poonam Tandon, Oxford University Press

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I-Year B.Tech. II-Sem: Mech. & Civil

COURSE OBJECTIVES:
1. Determine the internal forces in plane trusses.
2. Know the applications of trusses to cantilever and simply supported trusses.
3. Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of reference.
4. Apply work, energy, relationships for a particle in motion.
5. Apply impulse and momentum relationships for a particle in motion.
6. Describe the motion of a rigid body in different frames of reference.

UNIT-I

ANALYSIS OF PERFECT FRAMES: Analytical Method-Types of frames-Assumption for forces in members of a perfect frame. Method of Joints, Method of sections, Force Table, Cantilever Trusses, Structure with one end hinged & other freely supported on rollers carrying Horizontal & inclined loads.

UNIT-II


UNIT-III

KINETICS OF A PARTICLES: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies.

UNIT-IV

UNIT-V


TEXT BOOKS:


REFERENCES:


COURSE OUTCOMES:

The students will be able to

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

****
COURSE OBJECTIVES:
1. Development of Surfaces is most useful of real time applications of in industry.
2. Gain knowledge of sections of solids and their usage in real time applications.
3. Attain the concepts of isometric, orthographic projections

UNIT – I

DEVELOPMENT OF SURFACES: Development of Surfaces of Right, Regular Solids – Prisms, Cylinder, Pyramids, cone and their parts. Frustum of solids. [16]

UNIT – II

INTERSECTION OF SOLIDS:- Intersection of Cylinder Vs Cylinder, Prism Vs Prism, Cylinder Vs Prism, Cylinder Vs Cone. [16]

UNIT – III

ISOMETRIC PROJECTIONS: Principles of isometric Projection – Isometric Scale – Isometric Views – conventions –Isometric views of lines, Plane Figure, Simple and Compound Solids – Isometric Projection of objects having non – isometric lines, isometric projection of Spherical Parts. [16]

UNIT – IV

TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views to isometric views – simple objects. [14]

UNIT – V

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines and Plane Figure, Vanishing Point Methods (General Method only).

Introduction to AutoCAD: Draw lines, curves, plane geometries using AutoCAD commands. [16]
TEXT BOOKS
   1. Engineering Drawing. N.D.Bhatt

REFERENCES:
   1. Engineering Drawing – Besant, Agrawal, TMH

****
Objectives:

To provide a comprehensive working knowledge on the object oriented language C++ and to implement abstract data types, linear and nonlinear data structures for problem solving. To provide a foundation on generic programming based on overloaded concepts, inheritance and virtuality. To inculcate ability to grasp the behaviour of data structures such as stacks, queues, trees, hash tables, search trees, graphs and their representation and to apply them in problem solving. To provide a working knowledge on searching and sorting techniques and to write programs to solve problems on arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Syllabus Content

UNIT-1
C++ Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling. Function Over Loading, Operator Overloading,

UNIT-2
Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

UNIT-3
Basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++. Linked list operations insertion, deletion and searching. Hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

UNIT-4
UNIT-5
Graphs: Basic terminology, representations of graphs, graph search methods DFS, BFS, Suffix tries.

Text Books:

References:
5. Mastering Algorithms with C, K.Loudon, O’Reilly, SPD PVT.Ltd.
6. An introduction to Data structures and algorithms, J.A.Storer, Springer.

Course Outcomes:
CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: An ability to communicate effectively, both in writing and oral.
CO-5: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:
1. Understanding of fundamental concepts of abstract data types and general standard data structures.
2. Ability to design linear data structures stacks, queues and linked lists.
3. Ability to design nonlinear data structures, trees and graphs, and to implement their operations.
4. Ability to implement different searching and sorting techniques.
5. Ability to apply different searching and sorting techniques for real world problems.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES  
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)  

(AJ2307) ENGINEERING WORKSHOP / IT WORKSHOP  

I Year B.Tech. II-Sem: Mech., Civil & ECE  

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COURSE OBJECTIVES:  
1. Know the usage of various tools and their application in carpentry, tin smithy.  
2. Know the usage of various tools and their application in black smithy, foundry, welding and house wiring.  
3. Make lap joint and dove tail joint in carpentry.  
4. Make scoop, funnel and tray like items in tin smithy.  
5. Use one – way, two-way switches, parallel and series connections in house wiring.  
6. Know the basics of welding.  

UNIT – I  
TRADES FOR EXERCISES: (Any ten exercises are required to perform from the following trades)  

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<td>Carpentry</td>
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<td>2.</td>
<td>Fitting</td>
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<td>3.</td>
<td>Tin – Smithy</td>
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<td>Black Smithy</td>
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<td>5.</td>
<td>House – wiring</td>
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<td>6.</td>
<td>Plumbing</td>
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UNIT - II  
TRADES FOR DEMONSTRATION & EXPOSURE  

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<td>1. Demonstration of Power tools</td>
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<td>2. Welding.</td>
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UNIT – III  
IT WORKSHOP I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.  
IT WORKSHOP II: Installation of operating system windows and Linux simple diagnostic exercises.  

TEXTBOOKS:  

COURSE OUTCOMES:  
The students will be able to  
1. Know the fundamental knowledge of various trades and their usage in real time applications.  
2. Gain knowledge of Welding, Black smithy, Fitting and house wiring.  

***
OBJECTIVES:
This Course On Engineering Physics /chemistry Lab Designed With 12 Experiments In An Academic Year The Objective Of Course Is That The Student Will Have Exposure To Various Experimental Skills Which Is Very Essential For An Engineering Student The Experiments Are Selected From Various Areas Of Physics and chemistry Like Physical Optics, Lasers, Fiber Optics, Electricity And Basic Electronics, conductometry, potentiometry, etc.. Also The Students Is Exposed To Various Tools Like Screw Gauge, Vernier Callipers, Physical Balance, Spectrometer And Microscope, viscometer, stalagmometer, etc…

ENGINEERING PHYSICS

1. Determination of energy gap of semiconductor material of p-n junction diode
2. Determination of frequency of electrical vibrator by using Melde’s experiment
3. Determination of wavelength of LASER by using diffraction grating
4. Determination of rigidity modulus of given wire using Torsional pendulum
5. R-C circuit analysis
6. Determination of Numerical aperture of given optical fiber

Laboratory Manual:
1. Laboratory Manual Of Engineering Physics By Dr. Y.Aparna And Dr K. Venkateswara Rao (V.G.S Publishers )

ENGINEERING CHEMISTRY

1) Estimation of ferrous iron by dichrometry.
2) Estimation of hardness of water by EDTA method.
3) Conduct metric titration of strong acid vs. strong base
4) Titration of strong acid vs. strong base by potentiometry.
5) Determination of viscosity of sample oil by Ostwald’s viscometer.
6) Determination of Surface tension of lubricants.
TEXT BOOKS:
   2) Inorganic quantitative analysis, Vogel'

REFERENCE BOOKS:

1) Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel, Ane Books Private Ltd.,
2) A text book on experiments and calculation Engg. S.S. Dara'
   Instrumental methods of chemical analysis, chatwal, Anand, Himalaya Publications

****
Objectives:
To provide a comprehensive working knowledge on the object oriented language C++ and to provide implementation experience on abstract data types, linear and nonlinear data structures for problem solving. To provide a working knowledge on generic programming based on overloading concepts, inheritance and virtuality. To inculcate ability to grasp the behaviour of data structures such as stacks, queues, trees, hash tables, search trees, graphs and their representation and to apply them in problem solving. To provide an application oriented working knowledge on searching and sorting techniques and to write programs to solve problems on arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Syllabus Content

1. Write a C++ program to demonstrate class.
2. Write a C++ program on constructor.
3. Write a C++ program on inline functions.
4. Write a C++ program on this pointer.
5. Write a C++ program on function overloading.
6. Write a C++ program on operator overloading.
7. Write a C++ program that illustrates how run time polymorphism is achieved.
8. Write a C++ program on Multiple inheritance.
9. Write a C++ program to implement all the functions of a dictionary ADT.
10. Write a C++ program for single linked list operations.
11. Write a C++ program for hashing with quadratic programming.
12. C++ programs using class templates to implement the following using an array.
    a) Stack ADT   b) Queue ADT
13. Write C++ programs using class templates to implement the following using a singly linked list.
    a) Stack ADT   b) Queue ADT
14. Write C++ programs, using class templates, that use non-recursive functions to traverse the given binary tree in
    a) preorder   b) inorder   c) postorder.
15. Write C++ programs, using class templates, that use recursive functions to traverse the given binary tree in
    a) preorder   b) inorder   c) postorder.
16. Write a C++ program using class templates to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.
17. Write C++ programs using class templates for the implementation of bfs and dfs for a given graph.

Text Books:

6. The Art,Philosophy and Science of OOP with C++,Rick Miller,SPD.
7. C++ for Programmers ,P.J.Deitel and H.M.Deitel,PHI/Pearson.

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: An ability to communicate effectively, both in writing and oral.
CO-5: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:

1. Understanding of fundamental concepts of abstract data types and general standard data structures.
2. Ability to design linear data structures stacks, queues and linked lists.
3. Ability to design nonlinear data structures, trees and graphs, and to implement their operations.
4. Ability to implement different searching and sorting techniques.
5. Ability to apply different searching and sorting techniques for real world problems.

*****
Course Objective:
The main purpose of teaching Probability and Statistics is to develop the knowledge of the student. In the syllabus we concentrate on a few carefully selected basic ideas of general practical importance which are especially suitable for teaching the students probability and statistics to think and develop his own creative ability to solve engineering problem.

UNIT-I: Probability
Sample Space and events – Probability – The axioms of probability – Some Elementary theorems – Conditional probability – Baye’s theorem.

UNIT-II: Single Random Variables and Probability Distributions.

UNIT-III: Correlation & Regression

UNIT-IV: Sampling Distributions and Testing of Hypothesis
Sampling: Definitions of population, sampling, statistic, parameter. types of sampling, Expected values of Sample mean and variance, sampling distribution, standard error, sampling distribution of means and sampling distribution of variance. Parameter Estimations – Likelihood estimate, interval estimations. Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,
Large sample tests:
(i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
(ii) Tests of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

Small Sample Tests:
Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples
Snedecor’s F- distribution and it’s properties. Test of equality of two population variances Chi-square distribution , it’s properties, Chi-square test of goodness of fit

UNIT - V: Queuing Theory :

TEXT BOOKS:
1) Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor (chapters IV&V)
2) Probability and Statistics for Engineers and Scientists by Sheldon M.Ross, academic press

REFERENCES BOOKS:
2) Probability, Statistics and Stochastic Process by Prof.A R K Prasad, , Wiely India
UNIT-I

FIRST LAW OF THERMODYNAMICS: First law, applications to closed systems- internal energy – applications to open systems-enthalpy, Steady flow energy equation and its applications. Specific heats. Processes of closed system constant volume, constant pressure, Isothermal, adiabatic and polytrophic.

UNIT-II

UNIT-III
ENTROPY: Concept of entropy, Classius inequality, Entropy changes in various processes, Third law of thermodynamics.

AVAILABILITY AND IRREVERSIBILITY: Available energy, Available energy referred to a cycle, Helmholtz and Gibb’s functions, Availability in steady flow, entropy equation for a flow process, irreversibility, effectiveness.

UNIT-IV
THERMODYNAMIC RELATIONS: Max- well relations, coefficient of volume expansion, isothermal compressibility factor, T-ds Equations, difference in heat capacities, ratio of heat capacities, change in internal energy, entropy and enthalpy equations.

UNIT-V
GAS POWER CYCLES: Brayton, Otto, Diesel and dual cycles- calculation of air standard efficiency and mean effective pressure, Representation of Stirling, Ericsson and Atkinson cycles on P-V and T-S diagrams.

TEXT BOOK:
1. Engineering Thermodynamics / PK Nag /TMH.
2. Engineering Thermodynamics/ E Rathakrishnan/PHI.

REFERENCE BOOKS:
3. D S Kumar, Thermal science and Engineering, S K Kataria and sons, New Delhi
UNIT-I
SIMPLE STRESS AND STRAIN: Types of Loads, Definition of Stress, Strain, Types of stresses, strains, Stress Tensor, Strain tensor, stress strain diagrams for ductile and brittle materials, Generalized Hooke’s law, relation between elastic constants, Compound bars, Thermal stresses & strains.

SHEAR FORCE AND BENDING MOMENT: Types of supports, types of determinate beams simply supported, cantilever and overhang beams. Shear force and bending moment diagrams, principle of superposition.

UNIT-II
THEORY OF SIMPLE BENDING: Assumption, flexure formula, bending stresses in beams, discussion of efficiency of various cross-sections.
DEFLECTIONS OF BEAMS: Double integration method, Macaulay’s method and moment area method, slope and deflection for statically determinate beams.

UNIT-III
SHEAR STRESSES IN BEAMS: Flexural shear stress distribution in various shapes of cross sections of beams.
TORSION OF CIRCULAR SHAFTS: Theory of pure torsion in solid and hollow circular shafts, Torsional shear stresses and angle of twist, transmission of power. Compound shafts, torsion of tapered shafts.

UNIT-IV
COLUMN AND STRUTS: Column and strut, Types of columns, end conditions, Euler’s column Theory, different cases in Euler’s Theory, Limitations of Euler’s Theory, Rankine's formula.
STRAIN THEORY: Strain Energy, Resistance, proof Resistance Modulus of Resistance strain energy due to gradually applied load, strain energy due to suddenly applied load, impact loading, impact factor, strain energy due to freely falling weight, strain energy due to shear, strain energy due to torsion, strain energy due to bending.

UNIT-V
THIN AND THICK CYLINDERS: Cylindrical shells, distinguish between Thin cylinders and cylinders, circumferential stresses, Longitudinal stresses, Radial stresses, Thin cylinders subjected to internal pressure, Thin spherical shells. Thick cylinders, Lame’s Theory for thick cylinder, stresses in compound thick cylinders.

TEXT BOOK:

REFERENCE BOOKS:
UNIT-I
INTRODUCTION TO MATERIAL SCIENCE: Historical perspective, classification of materials, advanced materials, atomic structure and interatomic bonding. Influence on properties of materials, structures of crystalline solids, crystal structures, crystallography, planes and directions, polymorphism and allotropy. Determination of crystal structures by X-ray diffraction methods, non-crystalline solids. Introduction To Metallurgy.

PROPERTIES OF MATERIALS AND TESTING: Tension test, Compression Test, hardness tests - Brinell's, Vickers, Rockwell, Superficial hardness test and micro hardness testing. Impact testing, creep test, fatigue test and fracture of materials and testing.

UNIT-II
SOLIDIFICATION PROCESS AND IMPERFECTIONS IN SOLIDS: point, line, surface and volume defects, grain size determination, role of dislocations in strengthening materials, various mechanisms of strengthening, deformation behaviors of materials, elastic deformation, plastic deformation, and time dependent deformation processes, failure of materials, Fracture, fatigue and creep concepts and their significance.

UNIT-III
HEAT TREATMENT OF STEEL: principles of annealing, normalizing, hardening, tempering, surface hardening and age hardening, austempering, martempering, ausforming, marforming, thermo-mechanical treatments.
STRUCTURE AND PROPERTIES OF STEELS: low, medium and high plain carbon steels, stainless steels, wear resistant steels, high speed tool steels, free cutting steels, die steels, forging quality steels, and special alloys, for high temperature and magnetic applications, Haste alloys, Nimonic, Inconel Mu-metal, permalloys, Alnicos and Kanthal.

UNIT-IV
CAST IRONS: types and production of cast irons, white cast iron, malleable cast iron, grey cast iron, nodular cast iron, their properties and uses, alloy cast-iron, Ni-hard, Ni-resist, chilled cast iron and NitrociII Non-ferrous metals and alloys, properties and uses of Cu and Cu-alloys, Al and Al-alloys, Ni & Ni-alloys Mg & Mg-alloys and super alloys.

UNIT-V
POLYMER AND CERAMIC MATERIALS: Characteristics, applications and processing of polymers, mechanical and thermo-mechanical characteristics, polymer applications and processing, Ceramic materials and their structure, application and processing of ceramics, glasses, clay products, refractories and abrasives, composite materials, introduction to particle reinforced, fiber reinforced composites, structural composites.

TEXT BOOK:
1. Material Science and Metallurgy/kodigire.
2. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, New Delhi

REFERENCE BOOKS:
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ3313) PRODUCTION TECHNOLOGY

II Year B.Tech. ME-I-Sem

UNIT-I
CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT-II
Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment.
Methods of Melting: Crucible melting and cupola operation, steel making processes, special.

UNIT-III
A) Welding: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water ) welding.

UNIT-IV
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. Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V

TEXT BOOKS:

REFERENCE BOOKS:
2. Roy, A. Lindberg, Processes and Materials of Manufacture, 5/e, Prentice Hall of India, New Delhi
List of experiments to be performed

1. Direct tension test
2. Torsion test
3. Hardness test
   a). Brinells hardness test
   b). Rockwell hardness test
4. Test on springs
5. Compression test on cube
6. Impact test
7. Punch shear test
List of experiments

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.
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
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 (Water Plasma Device)

III MECHANICAL PRESS WORKING :
3. Bending and other operations

IV PROCESSING OF PLASTICS
1. Injection Moulding
2. Blow Moulding
Module 1: Values and Self Development—Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Module 2: Personality and Behavior Development—Soul and scientific attitude, God and scientific attitude, Positive thinking, Integrity and discipline, Punctuality, Love and kindness, Avoiding fault finding, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering love for truth, Aware of self destructive habits, Association and cooperation, Doing best, Saving nature.

Module 3: Character and Competence—Science vs. God, Holy books vs. blind faith, Self management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.


Module 5: Legislative Procedures—Indian constitution, Philosophy, fundamental rights and duties, Legislature, Executive and Judiciary, Constitution and function of parliament, Composition of council of states and house of people, Speaker, Passing of bills, Vigilance, Lokpal and functionaries.

Text Books:


Reference Books:

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations.

UNIT-I:

Ecosystems
Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II:

Natural Resources:
Classification of Resources, Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:

Biodiversity And Biotic Resources:
Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:


UNIT-V

Course Outcomes:

After undergoing the course the student would be able to know about

1. Understanding of Ecosystem,
2. Natural resources
   Depletion of natural resources & prevention of natural resources.
3. Biodiversity
   Protection, sharing of the biodiversity.
4. Environmental pollution
   Understanding of water, soil, noise, air pollutions and their control measurements.

SUGGESTED TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

6. The syllabus of Environmental Studies prescribed by UGC/JNTUH is approved for adoption.

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II Year B.Tech. II SEM: MECH  

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Course Objective:
This course introduces the concepts of basic electrical engineering parameters, quantities, analysis of AC and DC circuits, the construction operation and analysis of transformers, DC and AC machines. It also gives knowledge about operation of diode and transistor, characteristics and its applications.

UNIT- I
Network Theorems - Thevenin’s, Norton’s, Maximum Power Transfer, Superposition, Reciprocity Theorems with DC excitation.

UNIT- II

UNIT- III
D.C. Machines: Constructional features, Methods of Excitation, E.M.F. Equation and Applications, Torque development in D.C motor, Characteristics of DC motors, losses, Efficiency, Swinburne’s test, Speed control of DC Shunt motors
Single Phase Transformers: Construction and principle of operation, Development of No Load & On Load Phasor diagrams (Basic fundamentals only)
3-Phase Induction Motor: Constructional features, Principle of Operation (Basic fundamentals only)

UNIT- IV
P-N Junction Diode – Qualitative theory of P-N Junction, P-N Junction diode, V-I characteristic(Forward and Reverse), Temperature dependence, Ideal versus practical, Static and dynamic resistances.
Rectifiers and Filters - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Filters-Inductive and Capacitive with qualitative analysis.
UNIT- V

**Bipolar Junction Transistor (BJT)** - Construction, Principle of Operation, CB, CE and CC configurations.

**Junction Field Effect Transistor** - Construction, Principle of Operation, V-I Characteristic, Comparison of BJT and FET,

**Zener Diode and SCR Devices** - Zener diode characteristics, Use of Zener diode as simple regulator, Breakdown Mechanisms in Zener diode, Principle of Operation of SCR.( Basic fundamentals only).

**TEXT BOOKS:**
3. Electrical Machines – by P.S.Bimbra

**REFERENCES:**
1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

**Course outcomes:**
After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion, construction operation characteristics of DC machines and the constructional features and also fundamental and characteristics of diode and transistor. With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

*****
Course Objective:

To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organisations, capital budgeting and financial accounting and financial analysis.

Unit I
Introduction & Demand Analysis.


Unit II

Unit III
Markets & New Economic Environment:

Unit IV
Capital Budgeting:
Unit V

**Introduction to Financial Accounting & Financial Analysis:**

Financial, Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart

**References:**

UNIT I

UNIT II
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 III
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.

UNIT IV
Reciprocating Compressors: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.
Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

UNIT V
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:

REFERENCE BOOKS:
II Year B.Tech. ME-II-Sem

UNIT-I

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

UNIT-II

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

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

UNIT-III

Boundary Layer Concepts: Definition, thickness, 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-IV

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

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

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

UNIT-V

Centrifugal pumps: Classification, working, work done—manometric head—losses and efficiencies specific speed—pumps in series and parallel-performance characteristic curves, NPSH.

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

TEXT BOOKS:

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

1. Verification of Kirchhoff’s Laws.
2. Verification of superposition and Reciprocity Theorems.
3. Verification of Maximum Power transfer theorem.
4. Experimental Determination of Thevenin’s theorem.
5. Magnetization characteristics of DC Shunt Generator.
6. Swinburne’s Test on DC shunt machine.
7. Brake test on DC shunt motor.
8. OC & SC tests on single phase transformer.
9. PN Junction Diode characteristics (Forward bias, Reverse bias).
11. Transistor CE Characteristics (Input and Output)
12. Rectifier without filters (Full wave & Half wave)
13. Rectifier with filters (Full wave & Half wave)

Note: Student should perform 11 experiments out of 13 experiments.
Experiments 7 & 8 are optional.
Machine Drawing Conventions:
Need for drawing conventions – introduction to IS conventions
- Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- Title boxes, their size, location and details - common abbreviations & their liberal usage 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.
- Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- Keys, cottered joints and knuckle joint.
- Riveted joints for plates
- Shaft coupling, spigot and socket pipe joint.
- 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.
- Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod,
- Piston assembly.
- Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
- 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:
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES  
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH) 
(AJMC01) GENDER SENSITIZATION 
(An Activity – based Course)

II Year B.Tech. ME-II-Sem  
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Objectives of the Course:
To develop students sensibility with regard to issues of gender in contemporary India. To provide a critical perspective on the socialization of men and women. To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work. To help students reflect critically on gender violence. To expose students to more egalitarian interactions between men and women.

Learning Outcomes:
Students will have developed a better understanding of important issues related to gender in contemporary India. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. Students will acquire insight into the gendered division of labor and its relation to politics and economics. Men and women students and professionals will be better equipped to work and live together as equals. Students will develop a sense of appreciation of women in all walks of life. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.
Unit – I
UNDERSTANDING GENDER:
Gender: Why should we study it? (Towards a world of Equals: Unit – 1)
Socialization: Making women, making men (Towards a World of Equals: Unit – 2)
Just Relationships: Being Together and Equals (Towards a World of Equals: Unit – 12)

Unit – II
GENDER AND BIOLOGY:
Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit – 4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit – 10)
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit – 13)

Unit – III
GENDER AND LABOUR:
Housework: the Invisible Labor (Towards a World of Equals: Unit – 3)
“My Mother doesn’t Work”. *Share the Load*.
Women’s Work: Its Politics and Economics (Towards a World of Equals: Unit – 7)
Fact and Fiction. Unrecognized and Unaccounted work.
Further Reading: Wages and Conditions of Work

Unit – IV
ISSUES OF VIOLENCE:
Sexual Harassment: Say No! (Towards a World of Equals: Unit – 6)
Thinking about Sexual Violence (Towards a World of Equals: Unit – 11)
Blaming the Victim – “! Fought for my Life ……” – Further Reading. The Caste Face of Violence.

Unit – V
GENDERS STUDIES:
Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5)
Point of View. Gender and the Structure of Knowledge. Further Reading.
Unacknowledged Women Artists of Telangana
Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9)
Reclaiming a Past. Writing other Histories. Further Reading. Missing Pages from Telangana History.
Essential Reading: All the Units in the Textbooks, “Towards a World of Equals: A Bilingual Textbook on Gender” Written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is Interdisciplinary Course, resource Persons can be drawn from the fields of English Literature of Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:

III-Year B. Tech - I Semester (ME) L T P C
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Prerequisite: Thermodynamics

Objectives:
1. To learn main features of Rankine cycle and its performance improvement methods
2. To learn about components like boilers boiler accessories.
3. To learn the construction, function and performance of a steam nozzle.
4. To learn the salient features of impulse, reaction turbines and different types of condensers.
5. To learn about different types gas power cycles and its components.
6. To learn about classification and working of jet propulsion and rocket engines.

UNIT – I

UNIT II
Boilers: Classification – working principles – with sketches including H.P.Boilers – Mountings and Accessories – working principles
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 – III
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 effects, air pump- cooling water requirement.

UNIT – IV
Compressors and combustion chambers: Brief concepts about compressors – classifications of compressors - combustion chambers and its classifications.

UNIT – V

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

Outcomes:
1. Study the different thermal power plants and its workings.
2. Understand the cycles of steam power plant.
3. Knowing the working of components of steam power plant.
4. Getting knowledge about gas power plants and its components.
5. Understand the working of jet propulsion and rocket engines.
Prerequisites: Knowledge of Engineering Mechanics

Objectives:
1. The course under Kinematics of machinery has been designed to cover the basic concepts of kinematic aspects of mechanical machines and major parts used in running of the machines.
2. The students will understand the basic concepts of machines and able to understand constructional and working features of important machine elements.
3. The students should be able to understand various parts involved in kinematics of machines for different applications.
4. The students shall also be able to understand requirements of basic machine parts which would help them to understand the design aspects of the machine parts.

UNIT – I
Mechanisms and machines: 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. Inversions of four bar mechanism.


UNIT - II
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 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 – III
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 – IV
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, condition for minimum number of teeth to avoid interference and expressions for arc of contact and path of contact. Introduction to Helical, Bevel and worm gears.

UNIT – V

Text book:
1. Theory of Machines and Mechanisms-S.S.Rattan, TMH, Publishers

References:
1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh Pearsons Edn
5. The theory of Machines /Shiegley/ Oxford.

Outcomes:
1. Familiarity with common mechanisms used in machines in day to day life.
2. Ability to calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.
3. Ability to conduct a complete (translational and rotational) velocity, acceleration analysis of the mechanism and to understand steering mechanism and the importance of universal (Hooke’s) joint.
4. Helps to understand various cam motion profiles and follower mechanism, their classification and design based on the prescribed follower motion (SHM, constant velocity and acceleration).
5. At the end of this course students are able to understand gear mechanism classification and to become familiar with gear standardization and specification in design.
6. To understand importance of gear trains and their practical applications.
III-Year B.Tech-I Semester (ME)               L   T   P   C
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Prerequisite: Knowledge in metallurgy and material science and mechanics.

Objectives: The purpose of this course is to make the student aware of:

1. The fundamentals of metal cutting
2. The essentials of cutting tool materials
3. The basics of various machine tools and operations

UNIT -I
Elementary treatment of metal cutting theory – Element of cutting process -
Geometry of single point cutting tool and angles, chip formation and types of chip-
built up edge and its effects, chip breakers. Mechanics of orthogonal cutting-Merchant’s
force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants,
machinability – Tool materials.

UNIT – II
Engine lathe – Principle of working, specification of lathe – types of lathe – Taper
turning, thread turning – Lathes and attachments. Turret and capstan lathes – collet
chucks – other work holders – tool holding devices –tool layout. Principal features of
automatic lathes – classification – Single spindle and multi-spindle automatic lathes.

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

UNIT – IV
Milling machines – Principles of working – specifications – classifications of milling
machines – Principal features of horizontal, vertical and universal milling machines –
machining operations Types geometry of milling cutters – milling cutters – methods of
indexing – Accessories to milling machines, kinematic scheme of milling cutters –
milling cutters – methods of indexing.

UNIT – V
Grinding machines – Fundamentals – Theory of grinding – classification of grinding
machine – cylindrical and surface grinding machine – Tool and cutter grinding machine
– special types of grinding machines – Different types of abrasives – bonds
specification of a grinding wheel and selection of a grinding wheel Kinematic scheme
of grinding machines.
Lapping, Honing and Broaching machines – comparison to grinding, lapping and honing. Kinematics- lapping, honing and broaching machines. Constructional features of speed and feed, machining time calculations.

Text books:

References:
2. Work Courseshop Technology – B.S.Raghu Vamshi – Vol II

Outcomes: At the end of the course, students should be proficient to:
1. Define and explain nomenclature of single point cutting tool in various systems and select tool materials & tools and cutting environment for the machining processes.
2. Analyze geometry & characterization of chip and its formation. Determine various components of forces acting on single point tool & analyze and study economics of Machining.
3. Identify various M/c tools, tools & required operations to get a component machined, and estimate the machining time.
Prerequisites: Thermodynamics, Thermal Engineering, Heat Transfer

Objectives:
1. To understand and acquire the terminology used in refrigeration and air-conditioning.
2. To acquire the knowledge on VCR system.
3. To learn the performance and cycle analysis pertaining to VAR systems.
4. To understand the psychometric processes of air-conditioning systems.
5. To know the concepts of A/C systems and its load estimation procedures for different Air conditioning systems.

UNIT - I

Air Refrigeration System: Introduction - Air refrigeration system working on Reversed Carnot cycle – Air refrigeration system working on Bell Coleman cycle – COP - Open and Dense air systems, Applications.

UNIT - II


UNIT - III

UNIT - IV
Psychrometry: Introduction - Psychrometric properties and relations - Psychrometric chart Psychrometric processes - Sensible, Latent and Total heat – Sensible Heat Factor and Bypass Factor.
Human Comfort: Thermodynamics of Human body - Effective temperature – Comfort chart.

UNIT - V
Air Conditioning Systems: Introduction - Components of Air conditioning system - Classification of Air conditioning systems Central and Unitary systems - Summer, Winter and Year round systems- Cooling load estimation.
Design Of Air Condition Systems: Summer air conditioning – ADP-System with Ventilated and re-circulated air with and without bypass factor- RSHF, GSHF and ESHF.

NOTE: Refrigerants & Psychometric properties- by M.L. Mathur & F.S. Mehta data book will be supplied in the exam hall.

TEXT BOOKS

REFERENCES

Outcomes: After completion of the course, students are able to:
1. Demonstrate the basic concepts of refrigeration and related performance parameters.
2. Analyze the performance of VCR and VAR systems and differentiate with one another.
3. Design and develop the refrigerators using the VCR principles.
4. Demonstrate of psychometric properties and processes used in Air Conditioning.
5. Design and develop the Air-conditioning systems for thermal comfort conditions.
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5340) RENEWABLE ENERGY SOURCES

III-Year B. Tech - I Semester (ME)  
L  T  P  C  
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Prerequisite: Thermal Engineering, Heat Transfer

Objectives:
1. To learn the Potential importance of renewable energy sources.
2. To learn the geothermal, Wind Energy systems.
3. To learn Critical issues related to the OTEC and Tidal Energy systems.
4. To learn power generation from Bio mass plants.
5. To learn the Direct Energy Conversion system principles.

UNIT - I
Introduction:

UNIT - II

UNIT - III
OTEC - Principles – Heat Exchangers – Pumping requirements – Practical Considerations.
UNIT - IV
Bio-gas plant Technology and Status – The Energetic and Economics of Biomass systems – Biomass gasification

UNIT - V
**Direct Energy Conversion Systems:** Introduction to direct energy conversion systems, Carnot cycle limitations - Peltier effect, seebeck effect, Thomson effect, Figure of merit, materials , applications - Fuel Cells, efficiency of Fuel Cells, and Solar Cells– Thermionic.
**Thermoelectric Generation:** MHD Generator, principles, dissociation and ionization hall effect, magnetic flux -Open and Closed Systems, applications of direct energy energy conversion systems.

**Textbooks:**

**References:**

**Outcomes:** After the completion of course, students are able to
1. Design the various types of solar systems.
2. Develop the skills to operate and analyze geothermal energy plant.
3. Analyze the power generating capacities of Tidal, Ocean and Thermal Energy Conversion systems.
4. Design and Develop simple bio gas plants
5. Design and Develop the Direct Energy conversion systems.
II-Year B.Tech-I Semester (ME) | L | T | P | C
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**Prerequisites:** Fundamentals of Electrical and Electronics Engineering.

**Objectives:**
To provide an exposure on how to simulate a system or a process or an activity for detailed analysis, optimization and decision making which is essential to reduce the product design and development cost and time.

**UNIT – I**
**Introduction:** Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Systems, Graphical User Interface, and Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.


**UNIT – II**

**UNIT – III**
**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, resetable fuses, thermal dissipation - Power Supply - Bipolar transistors / mosfets

**UNIT – IV**
**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.

**Microcontrollers overview:** 8051 Microcontroller, micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming – Assembly, C (LED Blinking, Voltage measurement using ADC).
UNIT – V


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

References:

Outcomes:
The students will be able to design and develop products using simulation techniques.

- Be able to model and analyze electrical and mechanical systems and their interconnection.
- Be able to integrate mechanical, electronics, control and computer engineering in the design of mechatronics systems. Be able to do the complete design, building, interfacing and actuation of a mechatronic system for a set of specifications.
- Be proficient in the use of Lab VIEW software for data acquisition.
- Be proficient in the programming of microcontrollers.
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES  
(UGC AUTONOMOUS, AFFILIATED TO JNTUH) 
(AJ5320) THERMAL ENGINEERING LAB

III-Year B. Tech - I Semester (ME)  

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Prerequisites: Thermal Engineering

Objectives:
1. To learn the construction and working principle of I.C. Engines practically.
2. To understand the working principle and performance of air compressor practically.
3. To learn the heat balance test of an I.C. Engine.
4. To acquire the priorities given to the efficient use of energy and the minimization of environmental pollution.
5. To understand the usage of data acquisition systems.

LIST OF EXPERIMENTS:
At least 10 Experiments are required to be conducted

1. I.C. Engines Valve & Port Timing Diagrams
2. Performance Test on single cylinder 4-Stroke Diesel Engine by using Mechanical Dynamometer
3. Performance Test on Reciprocating Air – Compressor.
4. Evaluation of Engine friction by conducting Motoring/Retardation test on 4-stroke Diesel Engine.
5. Study of boilers.
7. Performance Test on single cylinder 2-Stroke Petrol Engine.
8. Performance test on Multi cylinder 4-stroke petrol engine by using Hydraulic Dynamometer.
9. Performance Test on Variable Compression Ratio single cylinder 4-Stroke Diesel Engine By using Eddy Current Dynamometer
10. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine.
11. Determine of economical speed test for fixed load on 4-stroke engine

Outcomes: After completion of the course students are able to:

1. Find the efficiency and performance of an engine system for a given set of conditions.
2. Analyze the Volumetric efficiency of air compressor.
3. Develop skills in data acquisition systems.
4. Evaluate the engine performance and explore the ways to improve the efficiency of engines.
5. Realize the need to minimize the losses in engines.
Objective:
To acquire skills to perform various machining operations on various machine tools namely Lathe, Milling, Shaping, Slotting, Planning, Drilling, Surface Grinding, Cylindrical Grinding Tool Cutter Grinding.

List of Exercises to perform:
1. Machining operations on Lathe. (Three Exercises)
2. Machining operations on Radial drilling machine. (Two Exercises)
3. Machining operations on Shaping Machine. (One Exercise)
4. Machining operations on Planning Machine. (One Exercise)
5. Machining operations on Slotting Machine. (One Exercise)
6. Machining operations on Milling Machine. (Two Exercises)
7. Machining operations on Cylindrical Grinding Machine. (One Exercise)
8. Machining operations on Surface grinding Machine. (One Exercise)
9. Tool and cutter grinder Machine. (One Exercise)

Outcomes:
Student has an ability to perform various machining operations on various machine tools such as Lathe, Milling, Shaping, Slotting, Planning, Drilling, Surface Grinding and Cylindrical Grinding Tool Cutter Grinding.
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 organize 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.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
- Resume’ writing – structure and presentation, planning, defining the career objective, projecting one's strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.

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:

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

ii) 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:

5. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
8. Books on TOEFL/GRE/GMAT/CAT by Barron’s/cup
9. IELTS series with CDs by Cambridge University Press.
15. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

**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.

***
Module 1:


Module 2:


Module 3:

Global Energy Scenario-Role of Energy in economic development and social transformation, over all energy demand, availability and consumption, depletion of energy resources and its impact on economy, Non proliferation of Nuclear energy. International policies of G-8, G-20 OPEC and European union countries.

Module 4:

Indian Energy scenario – Commercial and Non commercial forms of energy, Utilization pattern in the past, present and also future prediction, Sector wise energy consumption.

Module 5:


Text Books:


Prerequisites: Applied Mathematics- I, II, Thermodynamics, Thermal Engineering

Objectives:
1. To learn the basic differential equations of heat transfer in conduction, convection and radiation.
2. To acquire the phenomenon of critical thickness of Insulation, Heat Transfer in Fins.
3. To understand the significance of Non Dimensional Numbers in Heat Transfer
4. Natural and Forced Convection Mechanisms and correlations
5. To learn the basics of phase change processes of boiling and condensation in thermal systems and laws of radiation.
6. To learn about the LMTD, NTU concepts used in heat exchangers.

UNIT-I
Introduction and basic concepts of heat transfer: Modes and mechanisms of heat transfer - Basic laws governing conduction convection and radiation heat transfer – general discussion about applications of heat transfer.
Conduction heat transfer: Fourier heat transfer equation; Conduction-Basic Equations: Derivation of general form heat conduction equation in rectangular coordinates, heat conduction equation in cylindrical and spherical coordinates. Simplification forms of field equation - steady, unsteady and periodic heat transfer - Initial and boundary conditions of conduction problems.

UNIT-II
One dimensional steady state conduction: Steady state conduction in a homogeneous slab, hollow cylinders and spheres with and without heat generation, overall heat transfer coefficient, electrical analogy - critical thickness of insulation. Extended surface (fins) heat transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature.
One dimensional transient conduction heat transfer: Transient heat conduction in slab, long cylinder and sphere, systems with negligible internal resistance – significance of Biot and Fourier numbers - Use of transient temperature charts.

UNIT-III
Convective heat transfer: Classifications of systems based on causation of flow, condition of flow, configuration of flow and medium of flow. Dimensional analysis as a
tool for experimental investigation – Buckingham’s $\pi$-theorem and method - Significance of non-dimensional numbers – concepts of continuity, momentum and energy equations.

**Forced convection and Free or natural convection:** External flows: concepts about hydrodynamic and thermal boundary layer- use of empirical correlations for convective heat transfer - flow over a flat plate, horizontal plate, over a cylinder.
Internal flows – concepts about hydrodynamic and thermal boundary layer and use of empirical relations for horizontal pipe flow and annulus flow. Development of hydrodynamic and thermal boundary layer along a vertical plate - use of empirical relations for vertical, horizontal plates and cylinders.

**UNIT-IV**
**Heat transfer with phase change**
**Heat exchangers:** Classification of heat exchangers, overall heat transfer coefficient and fouling factors. Concept on LMTD and NTU methods – Problems. Concept on heat pipe.
**Boiling and Condensation:** Pool boiling – Regimes Calculations on Nucleate boiling, critical heat flux and film boiling. Types of condensation - Nusselt’s theory of condensation - vertical flat surface film thickness and horizontal cylinders using empirical correlations.

**UNIT-V**
**Radiation heat transfer:** Introduction, absorption and reflection of radiant energy, Emission, Radiosity and irradiation. Emission characteristics and laws of black-body radiation

**Text books:**

**References:**
4. Heat transfer: A practical / Yunus Cengel, Boles/ TMH.
5. Heat and mass transfer: R yadav/CPH

**Outcomes:**
1. Analyze the basic heat transfer concepts and their practical relevance in Planes, Cylinders and Spherical components.
2. To solve practical problems of steady and unsteady state heat transfer.
3. Develop skills to identify suitable Nusselt number empirical correlation for Planes, Cylinders.
4. To formulate the radiation heat exchange between two surfaces.
5. Design simple heat exchanger units of moderate capacity.

Objectives:
1. To understand concepts of static and dynamic mass balancing and energy fluctuations in flywheels.
2. To understand the concepts regarding various types of clutches, brakes and dynameters.
3. To develop the knowledge on various governors and reciprocating mass balancing.
4. Model the suspension system of light duty vehicle by using various concepts related to vibrational analysis.
5. Case Study on advanced systems in brakes.

UNIT – I
Precession: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships. Static and dynamic force analysis of planar mechanisms.
Clutches: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch and centrifugal clutch.

UNIT –II

UNIT –III
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 – IV
Balancing: Balancing of rotating masses Single and multiple – single and different planes.
Balancing of reciprocating masses: Primary, Secondary and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of “V” multi cylinder in line and radial engines for primary and
secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive efforts.

UNIT – V

Text books:

References:
1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shieglly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers

Outcomes:
1. Able to solve problems of static and dynamic mass balancing and energy fluctuations in flywheels.
2. Able to apply the concepts of various types of clutches, brakes and dynameters.
3. Able to acquire the knowledge on various governors and reciprocating mass balancing.
4. Able to model the suspension system of light duty vehicle by using various concepts related to vibrational analysis.
5. Capable to do Case Study on advanced systems in brakes.
Pre requisites: Mechanics, Strength of materials.

Objective:
1. To understand concepts of various types of stress concentration factors and application of failure theory geometries
2. To understand the concepts regarding riveted, welded, bolted joints and eccentric loading.
3. To understand the concepts of stresses in various joints like keys, cotters and knuckle.
4. To understand the concepts regarding design of bearings, shafts and different engine parts.
5. To acquire the concepts related to design and analysis of spur and helical gears.

UNIT – I

UNIT - II

UNIT – III

UNIT – IV
journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.

**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 V**


**Text books:**
3. Design Data hand Book, S MD Jalaludin, Anuradha Publishers

**References:**
1. Design of Machine Elements / V.M. Faires

**Outcomes:**
1. Able to apply the concepts of various types of stress concentration factors and application of failure theory geometries
2. Able to design riveted, welded, bolted joints for eccentric loading.
3. Able to design keys, cotters and knuckle joints using the concepts of stresses
4. Able to design bearings, shafts and different engine parts.
5. Able to design and analysis of spur and helical gears.
Prerequisites: Pre-requisites for FEM can be:
- Tensor calculus
- Strength of materials
- Basic solid mechanics

For a general knowledge of FEM including basic to detailed discussion, I can suggest the three-volume FEM book by O C Zienkiewicz & R L Taylor.

Objectives: Upon successful completion of this course, the student will be able to:
1. Apply vector mechanics as a tool for problem solving
2. Understand the need in Design for the Finite Element Method
3. Tie his/her understanding of mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently
4. Analyze a physical problem; develop experimental procedures for accurately investigating the problem, and effectively perform and document findings.
5. Understand forces associated with different parts of a machine

Unit-I
Introduction to FEM: Basic Concepts, historical background, application of FEM, General description, comparison of FEM with 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 a axial bar element in local co-ordinates using potential energy approach and virtual energy principle-properties of stiffness matrix. 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.

Unit-III
Stiffness equations for a truss bar element oriented in 2D plane-Finite element analysis of trusses- Planes truss and space truss elements-methods of assembly, Analysis of beams: Hermite shape functions-Elements stiffness matrix – Load vector-Problems
Unit-IV

**2-D Problems:** CST element – Stiffness matrix and load vector- Isoparametric element representation-Shape functions- Convergence requirements-Problems Two dimensional four noded isoparametric elements – numerical integration –finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements- 3-D problems. Tetrahedran elements.

Unit-V


**Text book:**

**References:**
4. Finite Element Methods/ Alavala/TMH

**Outcomes:**
Upon successful completion of this course, the student will be able to:
1. Understand the numerical methods involved in Finite Element Theory
2. Understand the role and significance of shape functions in finite element formulations and
   use linear, quadratic, and cubic shape functions for interpolation
3. Understand direct and formal (basic energy and weighted residual) methods for deriving
   finite element equations
4. Understand global, local, and natural coordinates
5. Understand the formulation of one-dimensional elements (truss and beam)
6. Understand the formulation of two-dimensional elements (triangle and quadrilateral
   continuum and shell elements)
7. Understand the formulation of three-dimensional elements (tetrahedral and brick elements)
8. Select appropriate space (planar (plane stress or strain), axisymmetric, or spatial),
   idealization (type of element), and modeling techniques
9. Perform and verify FEA using commercial FEA software
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6343) PLANT LAY OUT AND MATERIAL HANDLING

III B.Tech-II Semester (ME)     L  T  P  C
                                  3  1  0  3

Pre requisites: Knowledge of operations in industries.

Objectives: After the completion of this course the students will be able to:
1. Understand and be able to complete the following charts with regard to a specific product: assembly chart, route sheet, operations process chart, from-to chart, and activity relationship chart. Identify equipment requirements for a specific process.
2. Understand the benefit of an efficient material handling system.
3. Understand what effect process layout has on the material handling system.
4. Recommend improvements to existing plant layouts from the standpoint of material handling and product flow. Design flexibility into a plant layout to accommodate changes in product volume or product line. Integrate concepts and techniques learned through this course in order to design and efficient plant layout in a team environment.

UNIT-I:
Introduction – Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures, Overview of the plant layout, Process layout & Product layout selection, specification, implementation and follow up, comparison of product and process layout.

UNIT-II:
Heuristics for plant layout – ALDEP, CORELAP, CRAFT.

UNIT-III:
Group layout-Fixed position layout-Quadratic assignment model, Branch and bound method.

UNIT-IV:
Introduction, material handling systems, material holding properties, classification of material handling equipment, relationship of material handling to plant layout, Basic material handling systems: selection material handling method –path, equipment and function oriented systems.

UNIT-V:
Methods to minimize cost of Material Handling, maintenance of material handling equipments, safety in handling, 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, Laxmi publications

Outcomes:
1. At the end student able to the arrangement of physical facilities and material handling to optimize the interrelationships among operating personnel, material flow, and the methods required in achieving enterprise objectives efficiently, economically, and safely.
Prerequisites: Fundamentals of operations involved in manufacturing industries.

Objective:
This course aims to acquaint the students with principles, concepts and techniques that are essential in Automation in Manufacturing.

UNIT – I
Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.
Automated flow lines: Methods or work part transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – II
Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – III
Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyer systems, automated guided vehicle systems. Automated storage systems, Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – IV
FUNDAMENTALS OF INDUSTRIAL CONTROLS: Review of control theory. Logic controls, sensors and actuators, Data communication and LAN in manufacturing.

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

Text book:
References:
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
   Pearson, 2009

Outcomes:
Able to design and analyze automated flow lines and automated material handling systems. Able to apply BRP and BPE logistics.
III B. Tech - II Semester (ME)  

Prerequisites: Study the heat transfer subject thoroughly.

Objectives:
The objective of this heat transfer lab is to know the practical knowledge of various heat transfer modes and its applications.

List of experiments:
1. Composite Slab Apparatus — Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere.
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction.
8. Heat transfer in natural convection
10. Emissivity apparatus.
11. Stefan Boltzmann Apparatus.
14. Film and Drop wise condensation apparatus.

Outcomes
1. Obtain the practical knowledge of heat transfer by conduction, convection, and radiations.
2. Gain knowledge about how heat transfer will take place practically.
3. Also obtain how heat transfer takes place in extended surfaces.
4. Phase changes in different applications like heat exchanger, boiling and condensation.
OBJECTIVES:
1. To understand conversional representation of various joints and circuits on the part drawings.
2. To understand the representation of positional and geometrical tolerances, surface roughness indication and heat treatment symbols on the part drawings.

UNIT – I

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

UNIT – IV
Heat treatment and surface treatment symbols used on drawings.
Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – V
Part drawing using computer aided drafting by AutoCAD software.

Text books:
2. Machine Drawing with Auto CAD- Pohit and Ghosh, PE

Reference:

Outcomes: Able to prepare part drawings and process planning sheets.
Objective: To understand preparation of part drawings, modeling and analysis of various parts using application software.

- Solid modeling – Extrude, Revolve, Sweep, etc and Variational sweep, Loft, etc
- Surface modeling – Extrude, Sweep, Trim... etc and Mesh of curves, Free form etc
- Feature manipulation – Copy, Edit, Pattern, Suppress, History operations etc.
- Assembly - Constraints, Exploded Views, Interference check
- Drafting - Layouts, Standard & Sectional views, Detailing & Plotting.

Exercises in Modeling and drafting of Mechanical Components - Assembly using Parametric and feature based Packages like AutoCAD and PRO-E.

- Model analysis, structural analysis and thermal analysis of various parts using ANSYS.

Outcome:
1. Able to prepare part drawings various components using AutoCAD.
2. Able to model the various parts using ProE software.
3. Able to perform analysis of various parts using ANSYS software.
B.TECH
IV YEAR
I & II SEMESTER
SYLLABUS
Objectives:
1. To understand the importance of limits: fits tolerances in mass production. Learn how to design limit gauges. Also learn length standards and how to measure linear, angular and taper dimensions.
2. To learn surface roughness measurement, Gear tooth profile and screw thread measurement.
3. To learn generalized instrumentation system, and measurement methods used to measure various physical quantities such as displacement, strain, temperature, pressure, speed, flow and acceleration.

UNIT - I

UNIT – II

UNIT-III
Basic principle of measurement-Generalized configuration and functional description of measuring instruments. Static and dynamic characteristics.
Displacement measurement: Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, Capacitance and Resistance type transducers.
Strain measurement: Various types of strain measurements, electrical resistance strain gauge, gauge factor - configurations to measure tensile, compressive and bending strains.
UNIT-IV

**Temperature Measurement:** various principles of temperature measurements, expansion thermometers, resistance thermometers, thermistors, thermocouples, pyrometers.

**Pressure Measurement:** classification-different principles used. Bourdon pressure gauges, bellows, and diaphragm gauges. Low pressure measurement-thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

UNIT –V

**Flow measurement:** Rotometer, magnetic, ultrasonic, turbine flow meter, hot wire anemometer and Laser Doppler anemometer (LDA).

**Measurement of Speed:** Mechanical and electrical tachometers, Stroboscope and non contact type tachometers.

**Measurement of acceleration and vibration:** Principles of seismic instruments- vibrometer and Accelerometer.

**Textbooks:**
2. Instrumentation and mechanical measurements by A.K.Tayal, Galgotiya publications

**Reference:**

**Outcomes:**
1. Able to understand the importance of limits; fits tolerances in mass production. Learn how to design limit gauges. Also learn length standards and how to measure linear, angular and taper dimensions.
2. Able to learn surface roughness measurement, Gear tooth profile and screw thread measurement.
3. Able to learn generalized instrumentation system, and measurement methods used to measure various physical quantities such as displacement, strain, temperature, pressure, speed, flow and acceleration.
IV B. Tech - I Semester (ME)  

Objectives:
1. Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
2. Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.
3. Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring.
4. Model complex shapes including freeform curves and surfaces.
5. Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering.
6. Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.
7. Integrate the CAD system and the CAM system by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information.
8. Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

UNIT – I
Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

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

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

UNIT – III
**Numerical control:** NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

**UNIT – IV**
**Group Tech:** Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.
**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 – V**
**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 book:**
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
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI

**Outcomes:**
1. Able to learn the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
2. Able to Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.
3. Able to Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring,
4. Able to Model complex shapes including freeform curves and surfaces.
5. Able to understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverses engineering and virtual engineering.
6. Able to Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.
7. Able to Integrate the CAD system and the CAM system by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information.

8. Able to Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.
Prerequisites
1. Prerequisites Familiarity with linear algebra is required (e.g. Math 511 Linear Algebra or a basic Linear Algebra class)

Objectives
1. To formulate a real-world problem as a mathematical programming model
2. To understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
3. To understand the relationship between a linear program and its dual, including strong duality and complementary slackness
4. To perform sensitivity analysis to determine the direction and magnitude of change of a model’s optimal solution as the data change
5. To solve specialized linear programming problems like the transportation and assignment problems
6. To solve network models like the shortest path, minimum spanning tree, and maximum flow problems
7. To understand the applications of, basic methods for, and challenges in integer programming
8. To understand how to model and solve problems using dynamic programming
9. To model a dynamic system as a queuing model and compute important performance measures
10. To earn optimality conditions for single- and multiple-variable unconstrained and constrained non-linear optimization problems, and corresponding solution methodologies.

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 – I V


Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – V


Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

Text books:
1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).

References:
2. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspian & Lawrence Friedman
6. O.R/Wayne L.Winston/Thomson Brooks/cole
7. Introduction to O.R/Taha/PHI

Outcomes:
1. Student able to understand about Operations research (OR) has many applications in science, engineering, economics, and industry and thus the ability to solve OR problems is crucial for both researchers and practitioners.
2. Being able to solve the real life problems and obtaining the right solution requires understanding and modeling the problem correctly and applying appropriate optimization tools and skills to solve the mathematical model.
3. The goal of this course is to teach you to formulate, analyze, and solve mathematical models that represent real-world problems.
IV B. Tech - I Semester (ME)  L  T  P  C  
3  1  0  3

Prerequisites: Engineering Mathematics, Probability, Statistics.

Objectives: To understand basic principles of Reliability for ensuring sustainable product design. - Application to system requirements, design, manufacturing and testing. Understand in detail Asset Management, Maintenance, Quality and Productiveness,

UNIT I
Fundamental concepts of Reliability: Reliability terminologies, Role of the reliability function in the organization, Interrelationship of safety, quality and reliability, life characteristic phases, Product liability-Significance, importance of reliability, Introduction to maintainability, availability.
Concepts of Failure, failure density, failure Rate, hazard rate, pdf, cdf. Modes of failure, Mean Time to Failure (MTTF), Mean Time Between Failure (MTBF), Numericals based on calculation of failure rate, hazard rate. Warranty Management and Life cycle cost.

UNIT II

UNIT III
System reliability Analysis: Reliability Improvement- Redundancy, element redundancy, unit redundancy, standby redundancy types of stand by redundancy, parallel components single redundancy, multiple redundancies (Numericals). Introduction to Reliability allocation or apportionment, reliability apportionment techniques - equal apportionment, AGREE, ARINC, Minimum effort method (Numericals).

UNIT IV
Reliability Management: Objectives of maintenance, types of maintenance, Maintainability, factors affecting maintainability, system down time, availability - inherent, achieved and operational availability (Numerical treatment).
UNIT V
Reliability in Design & Development: Reliability techniques- Failure mode, effects analysis (FMEA), Failure mode, effects and criticality analysis (FMECA)-Case Studies, Basic symbols, Fault Tree construction and analysis, Monte Carlo Simulation. Introduction to Design of Experiments (DOE) and Taguchi Method. Human factors in design and design principles.

Text books:
2. Quality and Reliability in Engineering by Chandrupatla, Cambridge Uni. Press, India

References:
1. Reliability in engineering Designl by Kapur, Wiley india
4. Terotechnology and Reliability Engineering by Basu S.K, Bhaduri , Asian Books Publication
5. Reliability Engineering Theory and Practice, by Alessandro Birolini, Springer
7. Reliability Engineering and Life Testing, by V.N.A. Naikan, PHI Learning 2010
8. Reliability and Maintainability Engineering, by Charles E. Ebeling, TMH 2009
9. The New Weibull Handbook by Dr. Robert B. Abernathy,

Outcomes:
After completion of the course students would be able to, - Understand and analyze different methods of failure. - Calculate MTTF, MTBF, failure rate and hazard rate. - Different probability methods applied to Reliability. - Optimize Cost & reliability. - Perform FEMA, FMECA, DOE, Taguchi method.
Prerequisites: To learn various concepts related to numerical optimization and different manufacturing techniques.

Objectives:
1. The primary objective of this course is to provide an insight into how simulation modeling can aid in effective decision-making.
2. The bulk of the time in the course is spent on discrete event simulation modeling.
3. Simulation model building aspects of discrete systems (such as manufacturing and logistics facilities, supply-chains) are covered in detail.
4. It is also demonstrated how computer simulation can be used to successfully model, analyze and improve systems under study.
5. A simulation software (Arena) is used to demonstrate building and executing the models.
   Systems dynamics and continuous simulation are also covered in earlier part of the course.

UNIT - I

UNIT - II

UNIT - III
Generation of random variables - factors for selection methods - inverse transform - composition - convolution - acceptance - rejection - generation of random variables - exponential - uniform - weibull - normal Bernoullie - Binomial uniform - poisson -
Simulation languages - comparison of simulation languages with general purpose languages. Simulation languages vs Simulators - software features - statistical capabilities - G P S S - S1MAN- SIMSCRIPT - Simulation of WMJI queue - comparison of simulation languages.

UNIT - IV
Output data analysis - Types of Simulation w. r. t output data analysis – warm up period- Welch algorithm - Approaches for Steady - State Analysis - replication - Batch means methods - corn pan Sons.

UNIT - V
Applications of Simulation - flow shop system - job shop system - M/M1 queues with infinite and finite capacities - Simple fixed period inventory system – New boy paper problem.

Text book:

References:

Outcomes: Student Able to learn:
1. The bulk of the time in the course is spent on discrete event simulation modeling.
2. Simulation model building aspects of discrete systems (such as manufacturing and logistics
   facilities, supply-chains) are covered in detail.
3. It is also demonstrated how computer simulation can be used to successfully model, analyze
   and improve systems under study.
4. A simulation software (Arena) is used to demonstrate building and executing the models.
   Systems dynamics and continuous simulation are also covered in earlier part of the course.
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES  
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)  
(AJ7348) POWER PLANT ENGINEERING

IV B. Tech - I Semester (ME)  
L T P C  
3 1 0 3

Prerequisites: Thermal Engineering and Internal Combustion engines Gas Turbines

Objectives:
1. To learn about features and performance of a thermal power plant cycle
2. To learn about diesel engine and gas turbine power plants.
3. To learn about the hydroelectric and nuclear power plants.
4. To learn about nonconventional power plants.
5. To learn the procedure of power tariff calculations and economics of power generations

UNIT - I
Introduction: Various Energy sources - Types of power plants - Resources and Development of Power in India.
Steam power plant: Plant Layout - Working of Different circuits - Types of Coal - Coal handling systems - Coal storage - Overfeed and underfeed fuel beds - Pulverized Fuel burning system - Ash handling systems - Dust collection and its disposal - Mechanical type - Electrostatic Precipitator - Cooling Towers and heat rejection.

UNIT - II
Diesel power plant: Plant layout with auxiliaries - Fuel storage and Fuel supply system - Air supply system - Exhaust system - Water cooling system - Lubrication system - Starting system - Supercharging - Advantages and Disadvantages of Diesel plants over Thermal plants.
Gas turbine plant: Introduction - Classification - Layout with auxiliaries - Principles of working of Closed and Open cycle gas turbines - Combined cycle power plants and comparison.

UNIT - III
Hydro electric power plant: Hydrology - Hydrological cycle – Rainfall - Run off Hydrograph - Flow duration curve - Mass curve - Site selection of hydro plant - Typical layout - Different types of hydro plants.
Nuclear power plant: Nuclear Fission and Fusion - Nuclear Fuels – Breeding - Components of Reactor - Types of Nuclear Reactors - Pressurized water reactor(PWR) - Boiling water reactor(BWR) - CANDU reactor - Gas cooled reactor - Liquid metal cooled reactor - Fast Breeder Reactor - Nuclear waste and its Disposal.

UNIT - IV
**Direct energy conversion system:** Solar cell - Fuel cell - Thermo Electric and Thermo ionic conversion system - MHD generation.

**UNIT - V**

**Power plant economics:** Fixed cost - Operating cost - Fluctuating loads - General arrangement of Power Distribution - Load curves - Load duration curve - Connected load - Maximum demand - Demand factor - Average load - Load factor - Diversity factor - Plant capacity factor.

**Pollution and control:** Introduction - Particulate and gaseous pollutants - Air and Water pollution by thermal power plants and its control - Acid rains - Methods to control pollution.

**Textbooks:**

**References:**

**Outcomes:**
1. Develop awareness on different types of power generation systems.
2. Differentiate conventional and non conventional power plants.
3. Distinguish between polluting and non polluting power plants.
4. Acquire knowledge on the economic viability of various power generation systems.
5. Apply the power plant engineering concepts practically in developing low cost systems.
Prerequisite: Mechanics.

Course:
1. To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.
2. To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.
3. To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, and transverse shear and combined loading.
4. To build the necessary theoretical background for further structural analysis and design courses.

UNIT-I


UNIT-II

UNIT-III
Theories of Elastic Failure: The importance of failure theories in design, maximum normal strain, theory maximum shear stress theory, Max. axial strain theory, Energy distortion theory, applications. Fatigue Loads: Types of Fatigue loads, phenomenon of Fatigue failure, endurance limit, Stresses concentration and its importance in design, stress concentration factor, notch sensitivity, Soderberg equation, Goodman line, Gerber’s parabola, fatigue design under Combined loading.
UNIT-IV

**Bending of Curved Bars:** Stresses in bars of small initial curvature, strength in bars of large initial curvature, Extension of curved bars, practical design application. Springs: Closed coiled helical springs, deflection and stresses in helical springs, concentric springs, springs under variable loads.

UNIT-V


**Text books:**

**Reference:**

**Outcomes:**
1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to design a system, component, or process to meet desired needs such as economic, environmental, safety, manufacturability, and sustainability
3. An ability to identify, formulate and solve engineering problems
4. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice Course Assessment: Course will be assessed on the basis of the accomplishments regarding the course objectives and the contributions to the program outcomes.
5. The evaluation will consist mainly of the responses from the students, who will provide their comments to various course related questions in the final week of the semester.
IMC的对象:
1. 分析层压材料的宏观力学行为
2. 分析层压材料的微观力学行为
3. 分析层压材料的宏观力学行为
4. 分析弯曲、屈曲和振动的层合板和梁
5. 使用计算机程序获得层压材料的行为
6. 对选定的高级材料主题进行文献搜索并给出课堂报告

UNIT I
Introduction to composite materials: 定义-基体材料-聚合物-金属-陶瓷
增强剂: 粒子、 whiskers、无机纤维、金属纤维-陶瓷纤维
纤维制造-天然复合木材、亚麻-优势和缺点复合材料与单质材料。机械性能及应用
复合材料, 强化复合材料, 纤维增强复合材料

UNIT II
Manufacturing of composites: 制造聚合物基复合材料(PMCs)-手糊-喷射技术、纤维缠绕、Pultrusion、Resin Transfer Moulding (RTM)-, 包模、注射模压、Sandwich Mould Composites

UNIT III

Laminate Structural Moduli。Evaluation of Lamina Properties from Laminate Tests。Quasi-Isotropic Laminaes。Determination of Lamina stresses within Laminaes。
UNIT IV


UNIT V


Text Books:

References:
Outcomes:
1. Ability to understanding of types, manufacturing processes, and applications of composite materials
2. Ability to analyze problems on macromechanical behavior of lamina
3. Ability to analyze problems on micromechanical behavior of lamina
4. Ability to analyze problems on macromechanical behavior of laminate
5. Ability to analyze problems on bending, buckling, and vibration of laminated plates and beams
6. Ability to obtain laminate behavior using a computer program
7. Ability to perform literature search on a selected advanced material topic and giving class presentation
List of experiments to perform:

Section (A):
1. Measurement of lengths, heights, diameters by vernier calipers micrometer 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 and tooth thickness of spur gear.
6. Tool maker’s microscope and its applications
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Effective diameter of screw thread measurement by Two wire/ Three wire method/Tool makers microscope.
9. Surface roughness measurement by Taly Surf.

Section (B):
1. Calibration of pressure Gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain 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 rotometer 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.

Note: Any 6 Experiments to be performed from each section.
1. Drafting:
Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES.

2. Part Modeling:

3. FEA:
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. CAM:
a). Development of process sheets for various components based on tooling Machines.
b). Study of various post processors used in NC Machines.
c). Development of NC code for free form and sculptured surfaces using CAM packages.
d). Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package.
e). Quality Control and inspection.

Software Packages: Use of Auto CAD, Pro-E, ANSYS, Cut viewer etc.
Prerequisites: Internal Combustion Engines & Gas Turbines, Thermal Engineering

Objectives:
1. To understand components of an automobile and functions of each component.
2. To learn working of fuel injection pumps and advanced injection systems used.
3. To understand detailed study of sensors and modern Ignition systems.
4. To understand the working of transmission system components.
5. To acquire knowledge about suspension and braking systems in automobiles and Concept of steering geometry related to Vehicle dynamics applications.

UNIT – I
Introduction: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive.
Types of automobile engines and engine components: engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonization, Nitriding of crank shaft.

UNIT – II

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.
Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge– oil pressure
UNIT – IV
**Transmission System:** Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter.

UNIT – V
**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.

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

**Text books:**
2. Automobile Engineering / William Crouse

**References:**
1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.

**Outcomes:**
1. Develop different components of an automobile.
2. Develop the fuel feed systems in SI and CI engines, Sensors and Ignition systems.
3. Design various transmission systems.
4. Analyze the simple design oriented problems related to suspension systems, steering systems and braking systems.
Objective: To be familiar with the automation and brief history of robot and applications.
1. To give the student familiarities with the kinematics of robots.
2. To give knowledge about robot end effectors and their design.
3. To learn about Robot Programming methods & Languages of robot.
4. To give knowledge about various Sensors and their applications in robots.

UNIT – I

UNIT – II
Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.
Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – III

UNIT IV

UNIT V
Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading - Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Text books:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.
References:
   London.
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
   (ASIA) Pte Ltd.

Outcome: Students will be equipped with the automation and brief history of robot and applications.

1. Students will be familiarized with the kinematic motions of robot.
2. Students will have good knowledge about robot end effectors and their design concepts.
3. Students will be equipped with the Programming methods & various Languages of robots.
4. Students will be equipped with the principles of various Sensors and their applications in robots.
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES  
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)  
(AJ8353) GAS DYNAMICS  

IV B. Tech - II Semester (ME)  

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Prerequisites: Thermodynamics and fluid mechanics.

Objectives:
1. To understand the compressible flow fundamentals
2. To study the compressible flow with friction and heat transfer.
3. To know the application of normal shock in compressible flow.
4. To know the application of oblique shock in compressible flow

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

Properties of atmosphere, standard atmosphere, relative pressure - use of air and gas tables. Condition for neglecting compressibility - Compressible flow, acoustic velocity, Mach number, Mach cone, Mach angle.

UNIT II
Isentropic flow: Stagnation enthalpy, density, pressure and temperature - local acoustic speed, maximum speed - variation of Compressibility with Mach number. Von – Karma’s rules for supersonic flow.

Differences between Incompressible and Compressible flows: Variable flow, criteria for acceleration and deceleration - critical condition, nozzle discharge co-efficient, nozzle efficiency - operation of nozzles under varying backpressure.

UNIT III


UNIT IV
UNIT V
Flow with shocks and expansion waves at the exit of a convergent-divergent nozzle, Method of Characteristics.

Text books:
2. Zoeb Hussain,"Gas dynamics through problems” WILEY EASTERN LTD.

References:

Outcomes:
After successful completion of the course, the students should be able to
1. Know the differences between compressible and incompressible flows.
2. Solve problems in Rayleigh and Fanno flow.
3. Understand the shock formation in sub sonic flows and supersonic flows.
Prerequisites:
Knowledge on materials and machining processes

Objective:
To learn about various unconventional machining processes, the various process Parameters and their influence on performance measures and their applications.

UNIT – I
Introduction – Need for non-traditional machining methods-classification of modern machining processes – considerations in process selection. materials and applications.

UNIT – II
Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.
Abrasive jet machining, Water jet machining and abrasive water jet machine, Magnetic abrasive finishing: Basic principles, equipments, process variables, and mechanics of metal removal, application and limitations.

UNIT - III

UNIT - IV

UNIT – V
Electron beam machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes, influence of process parameters. Advantages, limitations and applications of EBM
Laser Beam Machining: –General Principle and application of thermal features, cutting speed and accuracy of cut.
**Plasma Arc Machining:** Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

**Text book:**
1. Advanced machining processes/ VK Jain/ Allied publishers.

**Reference:**
1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

**Outcomes:**
After completion of this course, the students can capable to express different Unconventional machining processes and,
1. able to select suitable machining process for suitable materials
2. able to select optimum parameters for the respective machining process
3. able to Influence of difference process parameters on the performance and their applications
Prerequisites: Fluid Mechanics; Numerical Methods in Computation; Heat Transfer

Objectives:
1. Computational Fluid Dynamics (CFD) is a core course in the graduate Thermal and Fluid Sciences Curriculum.
2. To study the numerical methods for physical simulations of gas and liquid flows and various computational problems in fluid dynamics.
3. To learn the software packages Matlab and ANSYS/FLUENT are used and the course provides an introduction to relevant features of the program.
4. A computational project using Matlab/FLUENT completes the course.

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:

UNIT IV:

UNIT V:

Text books:

References:

Outcomes:
1. Students are expected to learn how to formulate and solve computational problems arising in the flow of fluids.
2. They should be able to assess the accuracy of numerical solutions by comparison to known solutions of simple test problems and by mesh refinement studies.
3. Students should learn how CFD is used to predict forces on airfoils. Students are expected to communicate their work graphically and in writing.
4. Teamwork and oral communications are sometimes emphasized, depending on enrollment.
Prerequisites: Industrial Management

Objectives:
1. To understand the problems and opportunities faced by the operations manager in manufacturing and service organizations.
2. To develop an ability to apply PPC concepts in a various areas like marketing, accounting, finance, engineering, personnel management, logistics, etc.
3. To integrate operations concepts with other functional areas of business.
4. To understand the PPC function in both manufacturing and service organizations.
5. To examine several classic Operations Management planning topics including Production planning and inventory control.

UNIT – I
Introduction: Definition – Objectives of production Planning and Control – Functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

UNIT – II
Forecasting: Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

UNIT – III
Inventory management: Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P-Systems and Q-Systems – Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT – IV

UNIT – V

Text books:
1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production/ operation managements / Baffa & Rakesh Sarin

References:
Outcomes: Upon completion of this course the student will be able to:
1. Recognize the objectives, functions, applications of PPC and forecasting techniques.
2. Explain different Inventory control techniques.
3. Solve routing and scheduling problems
4. Summarize various aggregate production planning techniques.
5. Describe way of integrating different departments to execute PPC functions