ACADEMIC REGULATIONS (R17)
COURSE STRUCTURE AND DETAILED SYLLABUS
(CHOICE BASED CREDIT SYSTEM (CBCS))

MECHANICAL ENGINEERING

For

B. Tech. - Regular Four Year Degree Course
(Applicable for the batches admitted from 2017 - 2018)
&
B. Tech. - Lateral Entry Scheme
(Applicable for the batches admitted from 2018 - 2019)

CMR INSTITUTE OF TECHNOLOGY
(UGC - Autonomous)
Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with A Grade and NBA
Kandakoya(V), Medchal (M), Ranga Reddy (DisT.), Hyderabad-501 401, Telangana State
Landline: 08418-200720; Fax: 08418-200240
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CMR Institute of Technology, established in the year 2005 has been bestowed with autonomous status by the UGC from the Academic Year 2017-18 for its remarkable academic accomplishments accompanied by its unflinching spirit and dedication to impart quality technical education to the deserving aspirants. The institution has commenced functioning independently within the set norms prescribed by UGC and AICTE. The performance of the institution manifests the confidence that the prestigious monitoring body, the UGC has on it, in terms of upholding its spirit and sustenance of the expected standards of functioning on its own consequently facilitating the award of degrees for its students. Thus, an autonomous institution is provided with the necessary freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

CMR Institute of Technology takes pride for having won the confidence of such distinguished academic bodies meant for monitoring the quality in technology education. Besides, the institution is delighted to sustain the same spirit of discharging the responsibilities that it has been conveying since a decade to attain the current academic excellence, if not improving upon the standards and ethics. Consequently, statutory bodies such as the Academic Council and the Boards of Studies have been constituted under the supervision of the Governing Body of the College and with the recommendations of the JNTU Hyderabad, to frame the regulations, course structure and syllabi for autonomous status.

The autonomous regulations, course structure and syllabi have been framed in accordance with the vision and mission of the institution along with certain valuable suggestions from professionals of various ancillary fields such as the academics, the industry and the research, all with a noble vision to impart quality technical education and contribute in catering full-fledged engineering graduates to the society.

All the faculty members, the parents and the students are requested to study all the rules and regulations carefully and approach the Principal to seek any clarifications, if needed, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and for brightening the career prospects of engineering graduates.

PRINCIPAL
CMR INSTITUTE OF TECHNOLOGY

Vision: To create world class technocrats for societal needs.

Mission: Impart global quality technical education for a better future by providing appropriate learning environment through continuous improvement and customization.

Quality Policy: Strive for global excellence in academics & research to the satisfaction of students and stakeholders.

Department of Mechanical Engineering (ME)

Vision: To be a centre of excellence committed to provide quality education and research for nurturing technically competent and socially responsible mechanical engineering professionals

Mission: Provide state-of-art technical knowledge, research and consultancy in collaboration with industries and R&D organizations to meet the global and societal challenges in the field of mechanical engineering.

I. PROGRAMME EDUCATIONAL OBJECTIVES (PEO’s)

PEO1: Graduate will have effective foundation in mathematics, science, engineering, technology, management, humanities and various other interdisciplinary subjects for successful career in mechanical engineering and related fields.

PEO2: Graduate will be able to pursue higher education and research and/or become an entrepreneur / innovator to design and develop mechanical systems to address technical, business and global challenges.

PEO3: Graduate exhibits professional ethics, communication skills, teamwork and adapts to changing environments of engineering and technology by engaging in lifelong learning.

II. PROGRAMME OUTCOMES (PO’s)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms
of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
B.Tech. - Regular Four Year Degree Program  
(For batches admitted from the academic year 2017 - 18)  
&  
B.Tech. - Lateral Entry Scheme  
(For batches admitted from the academic year 2018 - 19)

PREAMBLE

For pursuing four year under graduate Bachelor Degree Programme in Engineering (B.Tech.) offered by CMR Institute of Technology under Autonomous status will herein be referred to as CMRIT (Autonomous).

All the specified rules are herein approved by the Academic Council. These rules will be in force and are applicable to students admitted from the Academic Year 2017-18 onwards. Any reference to “Institute” or “College” in these rules and regulations stand for CMRIT (Autonomous).

All the rules and regulations specified shall hereafter be read as a whole for the purpose of interpretation, as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, CMRIT (Autonomous) shall be The Chairman, Academic Council.

1. UNDER GRADUATE PROGRAMS OFFERED (E&T)

CMR Institute of Technology, an autonomous college affiliated to JNTUH, offers 4 Year (8 Semesters) Bachelor of Technology (B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2017 - 18 onwards, in the following Branches of Engineering:

1) B.Tech. - Civil Engineering  
2) B.Tech. - Mechanical Engineering  
3) B.Tech. - Electronics and Communication Engineering  
4) B.Tech. - Computer Science and Engineering

2. ADMISSION CRITERIA AND MEDIUM OF INSTRUCTION

2.1. Admission into first year of four year B.Tech. (Regular) Degree Programme:

2.1.1. Eligibility: A candidate seeking admission into the first year of four year B. Tech. Degree Programme should have:

(i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.

(ii) Secured a rank in the TSEAMCET examination conducted by TSCHE for allotment of a seat by the Convener, TSEAMCET.

2.1.2. Admission Procedure: Admissions are made into the first year of four year B.Tech. Degree Programme as per the stipulations of the TSCHE.

(a) Category A: 70% of the seats are filled through TSEAMCET counseling.  
(b) Category B: 30% of the seats are filled by the Management.
2.2. Admission into the second year of four year B. Tech. (Regular) Degree Programme Under Lateral Entry Scheme.

2.2.1 Eligibility: A candidate seeking admission under Lateral Entry Scheme (LES) into the II year I Semester B. Tech. Regular Degree Programme should have passed the qualifying examination (B.Sc. Mathematics or Diploma in concerned course) and have secured a rank at Engineering Common Entrance Test TSE CET (FDH). Admissions are made in accordance with the instructions received from the Convener, TSECET and Government of Telangana State.

2.2.2 Admission Procedure: Admissions are made into the II year of four year B.Tech. (Regular) Degree Programme through Convenor, TSECET (FDH) against the sanctioned intake in each Programme of study as lateral entry student.

2.3. Branch Transfers: There shall be no Branch transfers after the completion of Admission Process.

2.4. Medium of Instruction: The Medium of Instruction and Examinations for the entire B.Tech. programme will be in English only.

3. B.Tech. PROGRAMME STRUCTURE

3.1 Admitted under Four year B. Tech. (Regular) degree Programme:

3.1.1 A student after securing admission shall pursue the under graduate programme in B.Tech. in a minimum period of four academic years (8 semesters), and a maximum period of eight academic years (16 semesters) starting from the date of commencement of first year first semester, failing which, students shall forfeit their seat in B.Tech course.

3.1.2 Each semester is structured to provide 24 credits, totaling to 192 credits for the entire B.Tech. programme.

3.1.3 Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

3.2 Admitted under Lateral Entry Scheme (LES) into B. Tech. degree Programme:

3.2.1 The LES students after securing admission shall pursue a course of study for not less than three academic years (6 Semesters) and not more than six academic years (12 Semesters), failing which students shall forfeit their seat in B.Tech programme.

3.2.2 The student shall register for 144 credits and secure 144 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

3.3 UGC / AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are listed below:

3.3.1 Semester Scheme:

Each B.Tech. (Regular) Programme is of 4 Academic Years (8 Semesters) and B.Tech. (LES) Programme is of 3 Academic Years (6 Semesters), with the academic year being divided into two semesters of 22 weeks (≥ 90 Instructional days per semester), each Semester having ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’, Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum / Course Structure as suggested by AICTE.
3.3.2 Credit Courses:

a) 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 general pattern:

- One Credit - for One hour /Week / Semester for Theory /Lecture (L) Courses; and
- One Credit - for Two hours / Week / Semester for Laboratory / Practical (P) Courses

All Mandatory Courses, Study Tour, Guest Lecture, Tutorials, etc., will not carry any Credits.

b) Contact Hours: Weekly contact hours - equal to 33 hours per week (i.e. 1 hour = 60 Minutes) including credit and non-credit courses.

3.3.3 Subject / Course Classification and Nomenclature:

CMRIT has followed almost all the guidelines specified by AICTE / UGC / JNTUH for the classification of all subjects / courses offered at B.Tech. programme and are mentioned 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 (FnC)</td>
<td>BS – Basic Sciences</td>
<td>Includes - Mathematics, Physics and Chemistry Subjects</td>
<td>15%-20%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>ES – Engg. Sciences</td>
<td>Includes fundamental engineering subjects.</td>
<td>15%-20%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>HS – Humanities and Social Sciences</td>
<td>Includes subjects related to Humanities, Social Sciences and Management.</td>
<td>5%-10%</td>
</tr>
<tr>
<td>4</td>
<td>Core Courses (CoC)</td>
<td>PC – Professional Core</td>
<td>Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.</td>
<td>30%-40%</td>
</tr>
<tr>
<td>5</td>
<td>Elective Courses (EIC)</td>
<td>PE – Professional Electives</td>
<td>Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.</td>
<td>10%-15%</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>OE – Open Electives</td>
<td>Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.</td>
<td>5%-10%</td>
</tr>
<tr>
<td>7</td>
<td>Core Courses</td>
<td>Project Work</td>
<td>B.Tech. Project or UG Project or UG Major Project.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Industrial Training / Mini-Project</td>
<td>Industrial Training/ Internship/ UG Mini-Project/ Mini-Project.</td>
<td></td>
<td>10%-15%</td>
</tr>
<tr>
<td>9</td>
<td>Technical Seminar</td>
<td>Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Minor Courses</td>
<td>Minor Courses</td>
<td>1 or 2 Credit Courses (subset of HS)</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Mandatory Courses (MC)</td>
<td>Mandatory Courses (MC)</td>
<td>These courses are non-credit courses with evaluation.</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Audit Courses (AC)</td>
<td>Audit Courses (AC)</td>
<td>These courses are non-credit courses without evaluation</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total Credits for UGP (B. Tech.) Programme</td>
<td></td>
<td>192 (100%)</td>
<td></td>
</tr>
</tbody>
</table>
4. COURSE REGISTRATION

4.1 A ‘faculty advisor or counselor’ shall be assigned to each student, who advises the student about the B.Tech. programme, its course structure and curriculum, choice / option for subjects / courses, based on his/her competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites ‘registration forms’ from students before the beginning of the semester through online submission, ensuring ‘date and time stamping’. The online registration requests for any ‘current semester’ shall be completed before the commencement of SEEs (Semester End Examinations) of the ‘preceding semester’.

4.3 A student can apply for online registration, only after obtaining the ‘written approval’ from his faculty advisor or counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor and the student.

4.4 A student may be permitted to register for his/her subjects/course of choice with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credits, permitted deviation being± 17%), based on the student’s progress and SGPA / CGPA, and completion of the ‘pre-requisites’ as indicated for various subjects/courses, in the department course structure and syllabus contents. However, a minimum of 20 credits per semester must be registered to ensure the studentship in any semester.

4.5 Choice for ‘additional subjects / courses’ to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and signature of the faculty advisor / counselor.

4.6 If the student submits ambiguous choices or multiple options or erroneous (incorrect) entries during online registration for the subject(s) / course(s) under a given/specifyed course group / category as listed in the course structure, only the first mentioned subject / course in that category will be taken into consideration.

4.7 Subject / course options exercised through online registration are final and cannot be changed or interchanged; further, alternate choices will not be considered. However, if the subject / course that has already been listed for registration by Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the first week from the commencement of class-work for that semester.

4.8 Dropping of subjects / courses may be permitted, only after obtaining prior approval from the faculty advisor / counselor (subject to retaining a minimum of 20 credits), ‘within a period of 15 days’ from the commencement of that semester.

4.9 Open electives: Students have to choose one open elective wherever offered from the list of open electives given for their stream. However, student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.10 Professional electives: Students have to choose professional elective wherever offered from the list of professional electives given. However, students may opt for professional elective subjects offered in the related area.

4.11 Mandatory Courses (Non-Credit): All mandatory courses where ever offered require prior registration.
4.11.1 NSS / Physical Education / Yoga Requirements:

i) The student has to enroll for NSS / Physical Education / Yoga programme from the date of commencement of class work for I year I semester.

ii) The NSS / Physical Education / Yoga programme schedule will be announced time to time by the respective coordinator(s).

iii) The Student has to submit the NSS / Physical Education / Yoga certificate on or before the last instruction day of I year I semester, otherwise his / her Semester End Examination results will not be declared.

4.11.2 Micro Project Requirements:

i) The student has to enroll for Micro-Project from the date of commencement of I Year II Semester class work in any topic of their choice, in consultation with the class coordinator / Counselor.

ii) The student has to collect relevant information on Science / Engineering & Technological advancements, prepare and present a report to the department evaluation committee for assessment.

4.11.3 Internship / Industrial Training / Certification Course / MOOCs:

i) Student has to Enroll for Internship / Industrial Training / Certification Course / MOOCs under the guidance and approval from the concerned faculty advisor / Counselor on or before the date of commencement of class work for II Year I Semester.

ii) Internship / Industrial Training / Certification Course / MOOCs completion certificate must be submitted to the Head of the Department on or before the last instruction day of III Year II Semester, otherwise his / her Semester End Examination results will be withheld.

5. SUBJECTS / COURSES TO BE OFFERED

5.1 A subject/course may be offered to the students, if only a minimum 1/3 of students register to the course.

i) More than one faculty member may offer the same subject (lab / practical’s may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'first come first serve basis and CGPA criterion' (i.e. the first focus shall be on early on-line entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

ii) If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary decision, whether or not to offer such a subject / course for two (or multiple) sections.

6. ATTENDANCE REQUIREMENTS

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum 75% of attendance in aggregate (excluding the days of midterm examinations) for all the subjects / courses (excluding attendance in mandatory courses) in that semester.

6.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be granted by the college academic committee on genuine and valid grounds, based on the student’s representation with supporting evidence.
6.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

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

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if 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.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7. ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no. 6.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if student secures not less than 35% marks in the semester end examination (SEE), and a minimum of 40% of marks in the sum total of the Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) taken together; in terms of letter grades, this implies securing C grade or above in that subject/course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to industry oriented mini-project and seminar, if student secures not less than 40% of the total marks in each of them. The student would be treated as failed, if student (i) does not submit a report on his industry oriented mini-project, or does not make a presentation of the same before the evaluation committee as per the schedule, or (ii) does not present the seminar as required in the IV year I/II semester, or (iii) secures less than 40% of marks in industry oriented mini-project / seminar evaluations. Student may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such ‘one re-appearance’ evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

7.3.1 Four year B.Tech. (Regular):

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Promotion</th>
<th>Conditions to be fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First year first semester to first year second semester</td>
<td>Regular course of study of first year first semester.</td>
</tr>
</tbody>
</table>
| 2      | First year second semester to second year first semester | (i) Regular course of study of first year second semester.  
(ii) Must have secured at least 24 credits out of 48 credits i.e., 50% credits upto first year second semester from all the relevant regular and supplementary examinations whether the student takes those examinations or not. |
| 3      | Second year first semester to second year second semester | Regular course of study of second year first semester. |
| 4      | Second year second semester to third year first semester | (i) Regular course of study of second year second semester.  
(ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits upto second year |
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Promotion</th>
<th>Conditions to be fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Third year first semester to third year second semester</td>
<td>Regular course of study of third year first semester.</td>
</tr>
<tr>
<td>6</td>
<td>Third year second semester to fourth year first semester</td>
<td>(i) Regular course of study of third year second semester.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Must have secured at least 86 credits out of 144 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.</td>
</tr>
<tr>
<td>7</td>
<td>Fourth year first semester to fourth year second semester</td>
<td>Regular course of study of fourth year first semester.</td>
</tr>
</tbody>
</table>

### 7.3.2 Four year B.Tech. (LES):

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Promotion</th>
<th>Conditions to be fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Second year first semester to second year second semester</td>
<td>Regular course of study of second year first semester.</td>
</tr>
<tr>
<td>2</td>
<td>Second year second semester to third year first semester</td>
<td>(i) Regular course of study of second year second semester.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Must have secured at least 29 credits out of 48 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.</td>
</tr>
<tr>
<td>3</td>
<td>Third year first semester to third year second semester</td>
<td>Regular course of study of third year first semester.</td>
</tr>
<tr>
<td>4</td>
<td>Third year second semester to fourth year first semester</td>
<td>(i) Regular course of study of third year second semester.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.</td>
</tr>
<tr>
<td>5</td>
<td>Fourth year first semester to fourth year second semester</td>
<td>Regular course of study of fourth year first semester.</td>
</tr>
</tbody>
</table>

### 7.4 A student has to register for all subjects covering 192 credits (144 credits in case of LES) as specified and listed (with the relevant course / subject classifications as mentioned) in the course structure, fulfill all the attendance and academic requirements for 192 credits (144 credits in case of LES) securing a minimum of ‘C’ grade or above in each subject, and ‘earn all 192 credits (144 credits in case of LES) securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0, to successfully complete the under graduate programme.

### 7.5 After securing the necessary 192 credits (144 credits in case of LES) as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits (144 credits in case of LES) earned; resulting in 186 credits (138 credits in case of LES) for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits (138 credits in case of LES) shall alone be taken into account for the calculation of ‘the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)’, and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.
7.6 If a student registers for some more ‘extra subjects’ (in the parent department or other departments / branches of engineering) other than those listed subjects totaling to 192 credits (144 credits in case of LES) as specified in the course structure of parent department, the performances in those ‘extra subjects’ (although evaluated and graded using the same procedure as that of the required 192 credits (144 credits in case of LES)) will not be taken into account while calculating the SGPA and CGPA. For such ‘extra subjects’ registered, % of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 to 7.5 above.

7.7 A student eligible to appear in the semester end examination for any subject / course, but absent from it or failed (thereby failing to secure ‘C’ grade or above) may reappear for that subject / course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject / course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

7.8 A student detained in a semester due to shortage of attendance may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements. The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

7.9 A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which student has been readmitted shall be applicable.

8. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

8.1 The performance of a student in each semester shall be evaluated subject-wise / course-wise (irrespective of credits assigned) with a maximum of 100 marks. These evaluations shall be based on 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End Examination), and a letter grade corresponding to the percentage of marks obtained shall be given.

8.2 Evaluation of Theory Subjects / Courses

A) Continuous Internal Evaluation: For each theory subject, during the semester, there shall be 2 mid-term examinations of 30 marks each. Each mid-term examination consists of subjective paper for 25 marks & assignment for 5 marks and the average of the two mid-term examinations marks shall be taken as the final marks.

I. The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

II. The subjective paper shall be conducted for duration of 2 hours. Each subjective paper shall contain 2 parts (Part-A and Part-B). Part-A consists of one compulsory question with five sub questions carrying two marks each. Part-B consists of 3 essay questions carrying five marks each with internal choice; the student has to answer all 3 questions.

III. First assignment should be submitted before the commencement of the first mid-term examinations, and the second assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified / given by the concerned subject teacher.
IV. Absence in mid-term examination(s):

i) If any student is absent in one mid-term examination for any course on health grounds / any valid reasons approved by the college academic committee, only one test shall be conducted on all units by the college in each course at the end of each semester on payment of prescribed fee.

ii) If any student is absent in both mid-term examinations for any course on health grounds / any valid reasons approved by the college academic committee, only one test for 25 marks shall be conducted on all units and the marks secured out of 25 shall be divided by two, which shall be awarded against the said mid-term examination(s) on payment of prescribed fee.

B) Semester End Examinations: The duration of SEE is 3 hours. The details of the question paper pattern are as follows:

- The end semester examinations will be conducted for 70 marks consisting of two parts viz. i) **Part-A** for 20 marks, ii) **Part-B** for 50 marks.
- Part-A is compulsory question which consists of ten sub-questions (two from each unit) carry 2 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.

8.3 Evaluation of Practical Subjects / Courses: In any semester, a student has to complete a minimum of 10 experiments / exercises in each laboratory course and get the record certified by the concerned Head of the Department to be eligible for Semester End Examination.

For practical subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks and 70 marks for Semester End Examination (SEE).

A) Continuous Internal Evaluation (CIE): Out of the 30 marks, 15 marks are allocated for day-to-day work evaluation and for the remaining 15 marks - two mid-term examinations of each 15 marks will be conducted by the concerned laboratory teacher for a duration of two hours and the average of the two mid-term examinations is taken into account.

I. Absence in Laboratory Internal Examinations:

a. If any student is absent in one laboratory internal examination for any laboratory course on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted for 15 marks on all experiments of that laboratory course, by the college at the end of the semester.

b. If any student is absent in both the laboratory internal examinations on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted on all experiments and the marks secured out of 15 marks shall be divided by two, which shall be awarded against the said laboratory internal examinations.

B) Semester End Examination (SEE): The SEE for practical subject / course shall be conducted at the end of the semester with duration of 3 hours by one internal and one external examiner appointed by the Head of the Institution as per the recommendation of the concerned Head of the Department.
8.4 Evaluation of Design / Drawing Subjects / Courses: For the subjects such as Engineering Graphics, Machine Drawing and estimation, the distribution shall be 30 marks for CIE (15 marks for day-to-day work and 15 marks for internal examination) and 70 marks for SEE. There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.

8.5 Evaluation of Industry-Oriented Mini-Project: There shall be an industry-oriented mini-project, in collaboration with an industry of their specialization, to be registered immediately after III year II semester examinations, and taken up during the summer vacation for four weeks duration. The industry oriented mini-project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 marks by the committee consisting of Head of the Department, concerned supervisor and two senior faculty members of the department. There shall be no internal marks for industry-oriented mini-project.

8.6 Evaluation of Technical Seminar: The student has to enroll and get approval for technical seminar on a specialized topic from the concerned advisor / counselor in the beginning of IV year II semester. The student should collect the information on a specialized topic, prepare a technical report, give seminar presentation on the topic and submit it to the department as notified by the concerned Head of the Department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and two senior faculty members. The seminar report and the seminar presentation shall be evaluated for 100 marks. There shall be no semester end examination for the seminar.

8.7 Evaluation of Major Project: Student shall enroll for the project work during the IV year I semester, as per the instructions of the project guide / supervisor assigned by the Head of Department. Out of total 100 marks allotted for the project work 30 marks shall be for continuous internal evaluation and 70 marks for the end semester viva-voce examination. Out of 30 marks allocated for CIE, 15 marks shall be awarded by the project supervisor (based on the continuous evaluation of student’s performance throughout the project work period), and the other 15 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, and two senior faculty members, based on the work carried out and the presentation made by the student during internal reviews (at least two internal reviews shall be conducted). The project viva-voce shall be conducted by a committee comprising an external examiner, Head of the Department and Project Supervisor.

8.8 Evaluation of Mandatory Non-Credit Courses: For Mandatory non credit courses ‘Satisfactory’ or ‘Unsatisfactory’ shall be indicated instead of marks or letter grade and this will not be counted for the computation of SGPA / CGPA.

(i) For mandatory non-credit theory or practical courses such as Environmental Science & Technology, Gender Sensitization Lab, Human Values & Professional Ethics, Verbal Ability, Analytical Skills, Soft Skills, Quantitative Aptitude, the student has to secure ≥ 65% attendance and not less than 40 marks out of 100 marks in the CIE, then the student is declared as pass and will be qualified for the award of the degree.

(ii) For mandatory non-credit courses such as NSS / Physical Education / Yoga, Micro Project, Internship / Industrial Training / Certification Course / MOOCs, the student has to submit satisfactory participation certificate from the concerned authority.

9. GRADING PROCEDURE

9.1 Marks will be awarded to indicate the performance of each student in each theory subject, lab/practical’s, design/drawing practice, technical seminar, industry oriented mini-project and major project. Based on the percentage of marks obtained in Continuous Internal Evaluation plus Semester End Examination, both taken together, as specified in item 8 above, a corresponding letter grade shall be given.
9.2 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...

<table>
<thead>
<tr>
<th>% of Marks Secured (Class Intervals)</th>
<th>Letter Grade (UGC Guidelines)</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% and above (≥ 90%, ≤ 100%)</td>
<td>O (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>Below 90% but not less than 80% (≥ 80%, &lt; 90%)</td>
<td>A’ (Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>Below 80% but not less than 70% (≥ 70%, &lt; 80%)</td>
<td>A (Very Good)</td>
<td>8</td>
</tr>
<tr>
<td>Below 70% but not less than 60% (≥ 60%, &lt; 70%)</td>
<td>B’ (Good)</td>
<td>7</td>
</tr>
<tr>
<td>Below 60% but not less than 50% (≥ 50%, &lt; 60%)</td>
<td>B (above Average)</td>
<td>6</td>
</tr>
<tr>
<td>Below 50% but not less than 40% (≥ 40%, &lt; 50%)</td>
<td>C (Average)</td>
<td>5</td>
</tr>
<tr>
<td>Below 40% (&lt; 40%)</td>
<td>F (Fail)</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>Ab</td>
<td>0</td>
</tr>
</tbody>
</table>

9.3 A student obtaining ‘F’ grade in any subject shall be considered ‘failed’ and will be required to reappear as ‘supplementary student’ in the end semester examination (SEE), as and when offered. In such cases, his internal marks (CIE marks) in those subject(s) will remain same as those he obtained earlier.

9.4 A letter grade does not imply any specific % of marks.

9.5 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 that semester if he is detained.

9.6 A student earns grade point (GP) 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’ (CP) are computed by multiplying the grade point with credits for that particular subject/course.

\[
\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits}
\]

9.7 The student passes the subject/course only when he gets GP ≥ 5 (C grade or above).

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) 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

\[
\text{SGPA (S}_i\text{)} = \frac{\sum (C_i \times G_i)}{\sum C_i}
\]

Where \( C_i \) is the number of credits of the \( i^{th} \) course and \( G_i \) is the grade point scored by the student in the \( i^{th} \) course.

9.9 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 in all Semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year second semester onwards, at the end of each semester, as per the formula

\[
\text{CGPA} = \frac{\sum (C_i \times S_i)}{\sum C_i}
\]

where \( S_i \) is the SGPA of the \( i^{th} \) semester and \( C_i \) is the total number of credits in that semester.
Illustration of calculation of SGPA

<table>
<thead>
<tr>
<th>Course/Subject</th>
<th>Credits</th>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Credit Points</th>
<th>Semester</th>
<th>Credits</th>
<th>SGPA</th>
<th>Credits x SGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 x 8 = 32</td>
<td>Sem I</td>
<td>24</td>
<td>7</td>
<td>24 x 7 = 168</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4 x 10 = 40</td>
<td>Sem II</td>
<td>24</td>
<td>6</td>
<td>24 x 6 = 144</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>C</td>
<td>5</td>
<td>4 x 5 = 20</td>
<td>Sem III</td>
<td>24</td>
<td>6.5</td>
<td>24 x 6.5 = 156</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 x 6 = 18</td>
<td>Sem IV</td>
<td>24</td>
<td>6</td>
<td>24 x 6 = 144</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>A’</td>
<td>9</td>
<td>3 x 9 = 27</td>
<td>Sem V</td>
<td>24</td>
<td>7.5</td>
<td>24 x 7.5 = 180</td>
</tr>
<tr>
<td>Course 6</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 x 5 = 15</td>
<td>Sem VI</td>
<td>24</td>
<td>8</td>
<td>24 x 8 = 192</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>Sem VII</td>
<td>24</td>
<td>8.5</td>
<td>24 x 8.5 = 204</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>192</td>
<td></td>
<td>1380</td>
</tr>
</tbody>
</table>

SGPA = 152/21 = 7.23

Illustration of calculation of CGPA

<table>
<thead>
<tr>
<th>Course/Subject</th>
<th>Credits</th>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Credit Points</th>
<th>Semester</th>
<th>Credits</th>
<th>SGPA</th>
<th>Credits x SGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 x 8 = 32</td>
<td>Sem I</td>
<td>24</td>
<td>7</td>
<td>24 x 7 = 168</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4 x 10 = 40</td>
<td>Sem II</td>
<td>24</td>
<td>6</td>
<td>24 x 6 = 144</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>C</td>
<td>5</td>
<td>4 x 5 = 20</td>
<td>Sem III</td>
<td>24</td>
<td>6.5</td>
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<tr>
<td>Course 4</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 x 6 = 18</td>
<td>Sem IV</td>
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<tr>
<td>Course 5</td>
<td>3</td>
<td>A’</td>
<td>9</td>
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<td>7.5</td>
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<td>Course 6</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 x 5 = 15</td>
<td>Sem VI</td>
<td>24</td>
<td>8</td>
<td>24 x 8 = 192</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>Sem VII</td>
<td>24</td>
<td>8.5</td>
<td>24 x 8.5 = 204</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>192</td>
<td></td>
<td>1380</td>
</tr>
</tbody>
</table>

CGPA = 1380/192 = 7.18

9.10 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used.

9.11 For calculations listed in Item 9.6–9.10, 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. However, mandatory courses will not be taken into consideration.

10 PASSING STANDARDS

10.1 A student shall be declared ‘successful’ or ‘passed’ in a semester, if student secures a GP ≥ 5 (‘C’ grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); and a student shall be declared ‘successful’ or ‘passed’ in the entire undergraduate programme, only when he/she gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 A Student shall be declared ‘successful’ or ‘passed’ in any non-credit subject/course, if he secures a ‘Satisfactory Participation Certificate’ for that mandatory course.

10.3 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, no. of credits, grade earned etc.), credits earned, SGPA, and CGPA.

11 DECLARATION OF RESULTS

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6–9.9.

11.2 For Final percentage of marks equivalent to the computed final CGPA, the following formula may be used:

Percentage of Marks = (final CGPA – 0.5) x 10

12 AWARD OF DEGREE

12.1 After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes based on CGPA:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>Grade to be Secured</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>≥ 8 CGPA</td>
<td>From the aggregate marks secured from 192 Credits for Regular Students and 144 Credits for Lateral Entry Students.</td>
</tr>
<tr>
<td>First Class</td>
<td>≥ 6.5 to &lt; 8 CGPA</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>≥ 5.5 to &lt; 6.5 CGPA</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>≥ 5.00 to &lt; 5.5 CGPA</td>
<td></td>
</tr>
<tr>
<td>FAIL</td>
<td>CGPA &lt; 5</td>
<td></td>
</tr>
</tbody>
</table>
12.2 First class with distinction will be awarded to those students who clear all the subjects in single attempt during his / her regular course of study by fulfilling the following conditions:

(i) Should have passed all the subjects/courses in ‘first appearance’ within the first 4 academic years (or 8 sequential semesters) for B.Tech. (Regular) and first 3 academic years (or 6 sequential semesters) for B.Tech. (LES) from the date of commencement of first year first semester for B.Tech. (Regular) and II year I semester for B.Tech. (LES).

(ii) Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters (6 sequential semesters for LES), starting from I year I semester (starting from II year I semester for LES) onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in ‘first class with distinction’.

12.3 Award of Medals: Students fulfilling the conditions listed under item 12.2 alone will be eligible for award of ‘College Ranks’ and ‘Medals’.

12.4 Graduation Day: The College shall have its own Annual Graduation Day for the award of Degrees issued by the University.

12.5 Transcripts: After successful completion of prerequisite credits for the award of degree a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

13 WITH HOLDING OF RESULTS

If the student has not paid the fee to college at any stage, or has dues pending against his/her name due to any reason what so ever, or if any case of indiscipline is pending against him/her, the result of the student may be withheld, and he/she will not be allowed to go into the next higher semester.

14 SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for odd semester subjects will be conducted along with even semester regular examinations and vice versa.

15. TRANSITORY REGULATIONS

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R09/R13/R15/R16 Regulations due to lack of attendance, shall be permitted to join I year I semester of R17 Regulations and he is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student, who has been detained in any semester of II, III and IV years of R09/R13/R15/R16 regulations for want of attendance, shall be permitted to join the corresponding semester of R17 regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The R17 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

See rule (C) for further Transitory Regulations.
B. For students detained due to shortage of credits:

3. A student of R09/R13/R15/R16 Regulations, who has been detained due to lack of credits, shall be promoted to the next semester of R17 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R17 Academic Regulations are applicable to a student from the year of readmission onwards.

See rule (C) for further Transitory Regulations.

C. For readmitted students in R17 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R17 Regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 206, three subjects if total credits acquired are > 206 (see R16 Regulations for exemption details).

6. If a student readmitted to R17 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R17 Regulations will be substituted by another subject to be suggested by the CMRIT Academic Council.

Note: If a student readmitted to R17 Regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R17 Regulations, the Principal shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

D. Promotion Rule: Where the credits allotted to a semester/year under the regulations studied in are different from that under R17 regulations for the corresponding semester/year, the promotion rules of R17 vide section 7.3 shall be applied after normalization. Normalization is done by scaling down or up the number of credits of a semester/year under the previous regulations to equal the number of credits of the corresponding semester/year under R17 regulations and revising the secured credits also in the same proportion.

16 STUDENT TRANSFERS

There shall be no transfers from other colleges / streams.

17 RULES OF DISCIPLINE

17.1 Any attempt by any student to influence the teachers, examiners, faculty members and staff of Controller of Examination office for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.

17.2 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, student is awarded zero marks in that subject(s).

17.3 When the student’s answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Malpractice Prevention Committee is final.
18. MALPRACTICE

18.1 Malpractice Prevention Committee: The committee shall examine the student’s malpractice and indiscipline cases occurred, while conducting the examinations and recommend appropriate punishment to the Academic Council after taking explanation from the student and concerned invigilator as per the malpractice rules mentioned below. The committee consists of

a) Controller of Examinations - Chairman
b) Addl. Controller of Examinations - Convener
c) Subject Expert - Member
d) Head of the Department of which the student belongs to - Member
e) The Invigilator concerned - Member

18.2 Malpractice Rules: Disciplinary Action for Improper Conduct in Examinations

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nature of Malpractices / Improper Conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1(b)</td>
<td>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</td>
<td>Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Principal.</td>
</tr>
<tr>
<td>3</td>
<td>Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical’s and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
<td></td>
</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>
<td></td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancellation of the performance in that subject.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Refuses to obey the orders of the Addl. Controller of examinations / 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 addl. Controller of examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
<td></td>
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course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

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<table>
<thead>
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<tr>
<td>8</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td></td>
<td>Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
</tr>
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<tr>
<td>10</td>
<td>Comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
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<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
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<td></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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<tr>
<td>12</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the principal for further action to award suitable punishment.</td>
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19. **SCOPE**

i) The Academic Regulations should be read as a whole, for the purpose of any interpretation.

ii) The above mentioned rules and regulations are applicable in general to both B.Tech. (Regular) and B.Tech. (LES), unless and otherwise specific.

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

20. **REVISION AND AMENDMENTS TO REGULATIONS**

The Academic Council may revise 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 dates notified by the Academic Council.
COURSE STRUCTURE
# B.Tech. – R-17 COURSE STRUCTURE
(Applicable from the batch admitted during 2017-18 and onwards)

## I – B.Tech. – I – Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours Per Week</th>
<th>Credits</th>
<th>Scheme of Evaluation</th>
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<td>6</td>
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<td>IT &amp; Engineering Workshop</td>
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### Mandatory Course (Non-Credit)

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<td>9</td>
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<td>NSS / Physical Education / Yoga</td>
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## I – B.Tech. – II – Semester

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<td>Int.  Ext.  Tot.</td>
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## II – B.Tech. – I – Semester

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<td>Mechanics of Solids</td>
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<td>Kinematics of Machinery</td>
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<td>Fuels and Lubricants Lab</td>
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<td>Mechanics of Solids Lab</td>
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### Mandatory Course (Non-Credit)

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## II – B.Tech. – II – Semester

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<td>Fluid Mechanics &amp; Hydraulic Machines</td>
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<td>Machine Drawing</td>
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<td>Financial Analysis, Management &amp; Economics</td>
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**Note:** 1. Enrollment of Internship / Industrial training / Certification course / MOOCs initiation from II-B.Tech.-I-Semester
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Mandatory Course (Non-Credit)

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<td>9</td>
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<td>Human Values &amp; Professional Ethics</td>
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### III – B.Tech. – II – Semester

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**Mandatory Course (Non-Credit)**

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<td>10</td>
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<td>Internship / Industrial training / Certification course / MOOCs Certificate</td>
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**Note:**
1. Industry Oriented Mini Project Carried out during summer vacation between III-B.Tech. – II-Sem & IV- B.Tech. – I Sem and evaluated in IV-B.Tech.-I-Semester

2. Internship / Industrial training / Certification course / MOOCs certificate submission on or before last instruction day of III-B.Tech.-II semester
### IV – B.Tech. – I – Semester

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### Mandatory Course (Non-Credit)

### IV – B.Tech. – II – Semester

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ENGINEERING MATHEMATICS – I
(Differential Equations & Matrix Algebra)
(Common to all Branches)

Subject Code: 17ME1101BS

Pre Requisites: NIL

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

1. solve linear and non-linear ordinary differential equations
2. solve system of linear equations by using matrices
3. find Eigen values and Eigen vectors
4. find the extreme values of functions of several variables and evaluation of improper integrals by using Beta and Gamma functions
5. evaluate multiple integrals and find the line, surface and volume integrals and convert them by using multiple integrals

UNIT - I
Differential Equations: Introduction, exact & Reducible to exact, Linear and Bernoulie’s Differential Equations Applications to Newton’s Law of cooling, Law of natural growth and decay, orthogonal trajectories, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax}V(x), xV(x), method of Variation of parameters. Applications: Simple Harmonic Motion (SHM)

UNIT-II

UNIT –III
Eigen values, Eigen vectors and Quadratic forms: Eigen values, Eigen vectors and their properties, Cayley – Hamilton theorem (without proof),Inverse and powers of a matrix using Cayley – Hamilton, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – index and signature

Unit IV
Functions of Several Variables: Functions of several variables-Partial differentiation, Functional dependence, Jacobian, Maxima and Minima of functions of two variables with constraints and without constraints.

Beta and Gamma Functions: Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

Unit V
Multiple Integrals: Double and triple integrals, Change of variables, Change of order of integration. Applications: Finding areas, volumes & Center of gravity (evaluation using Beta and Gamma functions).

TEXT BOOKS:
Reference(s)

ENGINEERING PHYSICS

I-B.Tech.-I-Sem

Subject Code: 17ME1102BS

L T P C
4 0 0 4

Prerequisites: Nil

Course Outcomes: Upon completion of the course, the students will be able to
1. compare simple and damped harmonic oscillations
2. illustrate the interference and diffraction phenomena of light
3. examine the mechanism of various lasers and holography
4. demonstrate the propagation of light in optical fiber
5. analyze the properties of nanomaterials

Unit: I


Unit: II

4. Ultrasonics: Introduction, production of ultrasonic waves, magnetostriction method, piezo electric method, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for nondestructive testing, applications of ultrasonics.

Unit: III


Unit IV


Unit: V

9. Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Top-Down Fabrication: Chemical Vapor Deposition, Characterization Techniques (SEM & TEM) and Applications of Nanotechnology.
Text books:

1. Engineering Physics by P K.Palanisamy, Scitech Publishers
2. Modern Engineering Physics by Dr.K.Vijay kumar, Dr.S.Chandralingam, S.Chand & Company LTD.
4. Engineering Physics by Dr. M.Armugam, Anuradha Publication.

References:

2. Introduction to solid state physics by Charles Kittel, Wiley India Pvt Ltd,7th Edition
ENGINEERING CHEMISTRY

I-B.Tech.-I-Sem

Subject Code: 17ME1103BS

Prerequisites: Nil

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

1. identify the properties of water and various treatment methods
2. apply the concepts of electrochemistry and corrosion control
3. make use of polymers in domestic and industrial fields
4. analyze the quality of fuels used in automobiles, industry and aerospace
5. illustrate the properties of various engineering materials

UNIT-I

UNIT-II
Electrochemistry and Corrosion:

Batteries: Cell and battery – Primary battery (dry cell, alkaline and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell).


UNIT-III
Polymers: Definition – Classification of polymers with examples – Types of polymerization – addition(free radical mechanism), Co-Polymerization and condensation polymerization with examples.

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, properties and engineering applications of PVC and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and applications of Nylon -6, 6 and Dacron. Fiber reinforced plastics (FRP) – Applications.

Rubbers and Elastomers: Natural rubber and its vulcanization – compounding of rubber. – Preparation – properties and applications of Buna-S and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples – mechanism of conduction in trans- polyacetylene and applications of conducting polymers.

UNIT-IV
ENERGY SOURCES:
composition and uses of natural gas, LPG and CNG. Analysis of Flue gas by using Orsat’s apparatus. **Combustion:** Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value of solid fuels by using Bomb Calorimeter.

**UNIT-V**

**ENGINEERING MATERIALS:**
- **Cement:** Portland cement, its composition, setting and hardening of Portland cement.
- **Refractories:** Classification and characteristics of refractories, properties and application of Refractories.
- **Lubricants** Classification of lubricants with examples – characteristics of a good lubricants- mechanism of lubrication (thick film, thin film and extreme pressure) – properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.
- **Nano materials:** Introduction to nano technology, preparation, properties and applications of carbon nano tubes (CNTs)

**Text books:**

**Reference Books:**
ENGINEERING MECHANICS

I -B.Tech.-I-Sem

Prerequisites: Nil

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

1. analyze the resultant of a system of forces using principles of mechanics
2. apply the conditions of static equilibrium to particles and rigid bodies
3. determine mechanical efficiency of simple lifting machines, centroid and centre of gravity of simple sections
4. compute the second moment of inertia of various laminas and bodies
5. solve the problems involving kinetics and virtual work of particles

UNIT-I

UNIT-II
Friction: Types of friction – Limiting friction –Laws of Friction – Static and Dynamic Frictions-
Motion of Bodies – Wedge Screw, screw- jack.

UNIT-III
Centroid and Center of Gravity: Introduction – Centroids of Lines – Centroids of area- Centroids of Composite figures- Pappu’s theorems –Centre of Gravity of Bodies – Centroids of Volumes – Centre of gravity of composite bodies

UNIT-IV


UNIT-V

Text Books:

References:
COMPUTER PROGRAMMING

I-B.Tech.-I-Sem
Subject Code: 17ME1105ES

Prerequisites:
There are no prerequisites for this course, except that anyone who wants to learn C should have analytical skills and logical reasoning.

Course Outcomes: Upon completion of the course, the students will be able to
1. write simple programs using C language
2. design structured programs using functions
3. develop programs using arrays, strings and pointers
4. construct programs for heterogeneous data
5. implement various file operations in C programming

UNIT – I
Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts. Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT – II
Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs. Arrays – Concepts, using arrays in C, inter function communication, array applications- linear search, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT – III
Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions. Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT – IV
Enumerated, Structure and Union Types – The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Pre processor commands.

UNIT – V
Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions (fseek, rewind and ftell), C program examples.
Text Books:

Reference Books:
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.
Course Outcomes: Upon successful completion of this course, student will be able to

1. identify modulus of elastic materials, determine the characteristics & applications of LED and SOLAR CELL, find the energy gap of a semiconductor and analyze the wavelength of laser source
2. demonstrate the resonance of LCR circuit, determine Time Constant of RC circuit & find variation of the magnetic field and determine losses in optical fiber
3. determine the hardness, viscosity and pH of various samples
4. synthesize the drug used in pharmaceutical industry
5. estimate the strength of solutions and amount of coloured solutions

List of Engineering Physics Lab Experiments: (Any 08 experiments compulsory)

1. To determine the Rigidity modulus of a wire - Torsional pendulum.
2. Study the characteristics of LED and LASER Diode.
3. Verify the characteristics of a Solar Cell.
5. Bending Losses of Fibers & Evaluation of numerical aperture of given fiber.
7. Determination of Resonance frequency of an LCR circuit.
8. To calculate the Time constant of an R-C Circuit.
10. Magnetic field along the axis of current carrying coil-Stewart and Gee’s method.
12. Dispersive power of the material of a prism – Spectrometer.

Laboratory Manual:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)

List of Engineering Chemistry Lab Experiments: (Any 08 experiments compulsory)

I) Volumetric Analysis:

1. Estimation of Ferrous ion by Permanganometry.
2. Estimation of Ferrous and ferric ions in a given mixture by Dichrometry.
3. Estimation of hardness of water by Complexometric method using EDTA
4. Estimation of copper by Iodometry.
5. Estimation of percentage of purity of Mno₂ in pyrolusite.

II) Instrumental methods of Analysis:

Conductometry:

7. Estimation of HCl and Acetic acid in a given mixture by Conductometry.

Potentiometry:

8. Estimation of HCl by potentiometry.
Colorimetry:

9. Estimation of manganese in KMnO$_4$ by colorimetric method

p$^H$ meter:

10. Estimation of HCl by p$^H$ meter.

Physical property:

11. Determination of viscosity of oil by redwood / Oswald’s Viscometer.

Preparations:

12. Preparation of Aspirin.

Laboratory Manual:

COMPUTER PROGRAMMING IN C LAB

I-B.Tech.-I-Sem
Subject Code: 17ME1107ES

L T P C
0 0 3 2

Pre-requisite: Nil

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

1. execute simple programs using C compiler
2. apply control statements in designing programs
3. design programs using functions, arrays, strings and pointers
4. construct programs for heterogeneous data
5. implement various file operations in C programming

Week1: Basics

1. Write a program to print sample strings like “hello world”, “Welcome to C Programming” with different formats using escape sequences.
2. Write a Program to print different data types in „C“ and their ranges.
3. Write a Program to initialize, assignment & printing variables of different data types.

Week2: Operators

1. Write a Program to demonstrate arithmetic operators. (+, -, *, /, %)
2. Write a Program to demonstrate logical operators. (logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit – Centigrade and vice-versa)

Week3: Operators

1. Write a Program to demonstrate relational operators. (<, >, <=, >=, ==, !=)
2. Write a Program to demonstrate pre increment and post increment. (++a, a++ where a is a Value to be initialized)
3. Write a Program for computing the volume of sphere, cone and cylinder assume that Dimensions are integers use type casting where ever necessary.

Week4: Decision Statements

1. Write a Program to read marks of a student in six subjects and print whether pass or fail (Using if-else).
2. Write a Program to calculate roots of quadratic equation (using if-else).
3. Write a Program to calculate electricity bill. Read starting and ending meter reading.

   The charges are as follows.
   No. of Units Consumed Rate in(Rs)
   1-100 1.50 per unit
   101-300 2.00 per unit for excess of 100 units
   301-500 2.50 per unit for excess of 300 units
   501-above 3.25 per unit for excess of 500 units

Week5: Switch operations

1. Write a Program to perform arithmetic operations using switch case.
2. Write a Program to display colors using switch case (VIBGYOR).
3. Write a Program to display vowels and consonants using switch case.
4. Write a Program to display names of days in a Week using switch case.
Week 6: Basic Loop operations
Do the Following Programs Using for, while, do-while loops.
1. Write a program to calculate sum of individual digits of a given number.
2. Write a program to check whether given number is palindrome or not.
3. Write a program to print prime numbers in the given range.
4. Write a program to display multiplication tables from 1 to 10 except 3 and 5.

Week 7: Advanced loops
1. Write a program to print the Fibonacci series for given „N” value.
2. Write a program to check whether a given number is a Fibonacci number or not.
3. Write a program to read 2 numbers x and n then compute the sum of the Geometric Progression.
   \[1 + x + x^2 + x^3 + \cdots + x^n\]
4. Write a program to print the following formats.
   
   \[
   \begin{array}{c}
   1 \\
   1 2 \\
   1 2 3 \\
   \end{array}
   \]

   \[
   \begin{array}{c}
   \ast \\
   \ast \ast \\
   \ast \ast \ast \\
   \end{array}
   \]

   \[
   \begin{array}{c}
   1 2 3 4 \\
   \ast \ast \ast \ast \\
   \end{array}
   \]
5. Write a C Program to construct pyramid of numbers.

Week 8: 1-D arrays
1. Write a program to store 10 elements in the 1-D array and print sum of the array.
2. Write a program to print minimum and maximum elements in the 1-D array.
3. Write a program to count no. of positive numbers, negative numbers and zeros in the array.
4. Write a program to search the given element by using linear search and binary search.
5. Write a program to sort the given elements using bubble sort technique.

Week 9: 2-D arrays
1. Write a program to perform matrix addition
2. Write a program to perform matrix multiplication by checking the compatibility.
3. Write a program to print the transpose of a matrix.

Week 10: Functions
1. Write a program to find sum of two numbers using functions.
2. Write a program to find product of two numbers using functions without arguments, without return type.
3. Write a program to find difference of two numbers using functions without arguments, with return type.
4. Write a program to find sum of two numbers using functions with arguments &without return type.
5. Write a program to find product of two numbers using functions with arguments, with return type.

Week 11: Functions and Recursion
1. Write a program to swap two numbers using
   a) Call By Value B) Call By Reference.
2. Write a program to calculate factorial, gcd using recursion and non-recursion functions.
3. Write C program that reads two integers x and n and calls a recursive function to compute \(x^n\)
4. Write a C program that reads two integers and calls a recursive function to compute \(\text{ncr}\)

Week 12: Math Functions and I/O Functions
1. Write a program to read values from keyboard and find the values using \(\text{abs}(),\sqrt{()},\text{floor}(),\text{ceil}()\) and \(\text{pow}()\).
2. Write a program to read and display a value using \text{getch()} and \text{putch()}.
3. Write a program to read and display a value using \text{getchar()}, \text{putchar()}, \text{gets()} and \text{puts()}.
Week 13: Strings

1. Write a program to perform various string manipulations using built-in functions.
2. Write a program to print the given strings in ascending order.
3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions).
4. Write a program to concatenate two strings using arrays.

Week 14: Structures

1. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of five account holders.
2. Write a program to find total marks of individual student and average marks for 10 students using structures.
3. Write a program to create structure called traveler and members of structure are train no, coach no, seat no, source, destination, gender, age, name and departure date.
4. Write a program to illustrate passing an entire structure to a function.
5. Write a C Program to perform addition and multiplication of two complex numbers using structures.

Week 15: File operations

1. Write a program which copies the contents of one file to another file.
2. Write a program to reverse the first n characters in a file.
3. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
4. Write a C program to count the number of times a character occurs in a text file.

Reference Books:

5. AL Kelly, Irphol, Programming in C, 4th edition Addison-Wesley – Professional
IT & ENGINEERING WORKSHOP

I-B.Tech.-I-Sem. Subject Code: 17ME1108ES

L T P C
0 0 3 2

Pre-requisites: Practical skill

Course Outcomes: Upon completion of the course, the students will be able to
1. install and make use of operating systems and MS office tools
2. configure fire walls and trouble shoot network connections
3. apply safety norms while handling the workshop equipment
4. prepare required models using various engineering trades
5. make use of various power tools

LIST OF EXPERIMENTS

Part A- IT Workshop

Week-1: WINDOWS OPERATING SYSTEM & DRIVERS INSTALLATION
Windows 7, Windows 8 and Windows 10. LAN, graphics, audio, video and command prompt, commands.

Week-2: NETWORK CONNECTIONS & TROUBLESHOOTING
IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over. Hardware, troubleshoots, software troubleshooting.

Week-3: Cyber Hygiene: Introduction to Virus, worms, threats. Threats on internet, Configure the Systems to be internet safe, Install antivirus, personal firewall, block pop-ups, block active x downloads.

Week-4: MS WORD
Prepare the project document and resume.

Week-5: MS EXCEL
Spreadsheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.

Week-6: MS POWER POINT
Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.

Part B- Engineering Workshop

Week-7: HOUSE WIRING
Power point, light fitting and switches.

Week-8 & 9: CARPENTRY
Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.

Week-10,11 &12: FITTING
Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints.

Week-13 & 14: Tin Smithy & Black Smithy
Tin smithy:-Preparation of Open scoop, Cylinder, square/rectangular tray, Black Smithy:-S-Hook,
Square /Hexagonal headed bolt.

**Week 15: Demonstration of Power Tools:** - Bench drilling machine, hand drilling machine, power hacksaw, grinding machine and wood cutting machine.

**Text Books:**
3. Microsoft Office 2016 Step by Step (Microsoft)
NATIONAL SERVICE SCHEME (NSS) / PHYSICAL EDUCATION / YOGA
MANDATORY COURSE (NON-CREDIT)

I-B.Tech.-I-Sem.
Subject Code: 17AC1108MC

Note: The student has to enroll in NSS and/or Physical Education programme from the date of commencement of class work for I Year I Semester and should produce the participation certificate on or before the last instruction day of I year I semester to the satisfaction of concerned authority.

NATIONAL SERVICE SCHEME (N.S.S.)

Aim of NSS Programme: The programme aims to inculcate social welfare in students, and to provide service to society without bias. NSS volunteers work to ensure that everyone who is needy gets help to enhance their standard of living and lead a life of dignity. In doing so, volunteers learn from people in villages how to lead a good life despite a scarcity of resources. It also provides help in natural and man-made disasters by providing food, clothing and first aid to the disaster victims. The Main Objectives and outcomes are:

Outcomes: After Involvement in NSS activities, student is able to
1. identify the needs and problems of the community and involve them in problem-solving
2. develop instant solutions to handle emergencies and natural disasters
3. maintain national integration and social harmony
4. utilize their knowledge in finding practical solutions to individual and community problems
5. demonstrate leadership and democratic skills

Activities:
The student has to participate in any of the following activities.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Activity</th>
<th>S.No.</th>
<th>Name of the Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First-aid</td>
<td>9</td>
<td>Anti-Ragging Awareness</td>
</tr>
<tr>
<td>2</td>
<td>Blood donation camp</td>
<td>10</td>
<td>Social Activities Awareness</td>
</tr>
<tr>
<td>3</td>
<td>Traffic awareness program</td>
<td>11</td>
<td>Cyber Crime</td>
</tr>
<tr>
<td>4</td>
<td>Environmental Awareness</td>
<td>12</td>
<td>Digital India</td>
</tr>
<tr>
<td>5</td>
<td>Swachh Bharat Abhiyan</td>
<td>13</td>
<td>Substance Abuse Awareness Program (SAAP)</td>
</tr>
<tr>
<td>6</td>
<td>Health awareness program</td>
<td>14</td>
<td>Telanganaku Haritha Haram (Sapling Plantation)</td>
</tr>
<tr>
<td>7</td>
<td>Garments / Essential Education Material Collection and distribution</td>
<td>15</td>
<td>Fire Safety Awareness</td>
</tr>
<tr>
<td>8</td>
<td>Non-formal education</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PHYSICAL EDUCATION / YOGA

Aim of Physical Education: The aim of course is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.

Outcomes: At the end of the course students should be able to

1. demonstrate an understanding of the principles of physical activities to lead a healthy lifestyle
2. compose and communicate ideas through movement
3. display acquired motor skills necessary to perform, apply tactics, strategies, rules in both individual and group activities
4. show sensitivity to evaluate performance, set goals for future development of their own and different cultures
5. show initiative, creativity and a willingness to pass the knowledge, skills and techniques to others in the community

Activities:
The student has to participate in any of the following physical activities.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Individual Event</th>
<th>S.No.</th>
<th>Name of the Team Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Badminton</td>
<td>1</td>
<td>Basketball</td>
</tr>
<tr>
<td>2</td>
<td>Gymnastics</td>
<td>2</td>
<td>Football</td>
</tr>
<tr>
<td>3</td>
<td>Judo</td>
<td>3</td>
<td>Hockey</td>
</tr>
<tr>
<td>4</td>
<td>Swimming</td>
<td>4</td>
<td>Kabaddi</td>
</tr>
<tr>
<td>5</td>
<td>Table Tennis</td>
<td>5</td>
<td>Kho –Kho</td>
</tr>
<tr>
<td>6</td>
<td>Tennis</td>
<td>6</td>
<td>Volleyball</td>
</tr>
<tr>
<td>7</td>
<td>Weight Lifting and Power Lifting</td>
<td>7</td>
<td>Cricket</td>
</tr>
<tr>
<td>8</td>
<td>Wrestling</td>
<td>8</td>
<td>Hand ball</td>
</tr>
<tr>
<td>9</td>
<td>Yoga</td>
<td>9</td>
<td>Throw ball</td>
</tr>
<tr>
<td>10</td>
<td>Archery</td>
<td>10</td>
<td>Badminton</td>
</tr>
<tr>
<td>11</td>
<td>Body Building</td>
<td>11</td>
<td>Table Tennis</td>
</tr>
<tr>
<td>12</td>
<td>Carroms</td>
<td>12</td>
<td>Tennis</td>
</tr>
<tr>
<td>13</td>
<td>Chess</td>
<td>13</td>
<td>Swimming</td>
</tr>
<tr>
<td>14</td>
<td>Boxing</td>
<td>14</td>
<td>Carroms</td>
</tr>
<tr>
<td>15</td>
<td>Taekwondo</td>
<td>15</td>
<td>Taekwondo</td>
</tr>
<tr>
<td>16</td>
<td>Fencing</td>
<td>16</td>
<td>Fencing</td>
</tr>
<tr>
<td>17</td>
<td>Athletics</td>
<td>17</td>
<td>Athletics</td>
</tr>
</tbody>
</table>
I-B.TECH.-II-SEMESTER
SYLLABUS
ENGINEERING MATHEMATICS – II
(Vector Calculus, Fourier Analysis & PDE)
(Common to all Branches)

I-B.Tech.-II-Sem. 
Subject Code: 17ME1201BS

Course Outcomes: Upon completion of the course, the students will be able to
1. solve ODE by using Laplace transforms
2. determine vector field, scalar field, gradient, divergence and curl by using vector differentiation
3. solve the line, surface and volume integrals by using vector integration
4. find periodic functions in terms of Fourier series and non-periodic functions of Fourier transform
5. formulate Partial Differential Equation, solve Linear and non-linear Differential Equations and analyze one dimensional heat and wave equation

Unit I

Unit II
Vector Differentiation: Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities.

Unit III
Vector Integration: Line Integral, Work done, Potential function, area, surface and volume integrals. Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems

Unit IV
Fourier Transform of Convolution Products (Without Proof)

Unit V
Partial Differential Equations and Applications: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions–solutions of first order linear (Lagrange) equations and nonlinear equations (Four standard types)–Method of Separation of Variables–Applications to wave equation, heat conduction equation in one dimension.

Textbook(s)

References
PROFESSIONAL COMMUNICATION IN ENGLISH

Subject Code: 17ME1202HS

Course Outcomes: Upon completion of the course, the students will be able to
1. apply appropriate vocabulary and grammar
2. use effective writing skills in formal and informal situations
3. demonstrate reading skills to pursue research and academic activities
4. apply and exhibit professional and social Etiquette
5. employ reference and study skills for lifelong learning

SYLLABUS

Reading Skills:
Objectives:
To develop an awareness in students about the significance of silent reading and comprehension.
To develop students’ ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc., by way of:
- Skimming and Scanning the text
- Intensive and Extensive Reading
- Reading for Pleasure
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Recognizing Coherence/Sequencing of Sentences

NOTE: The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different ‘unseen’ passages which may be taken from authentic texts, such as magazines/newspaper articles.

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

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five Units, are prescribed:

Text Books:
- “Fluency in English – A Practice Manual” for B.Tech I year I Sem (ECE&CE) & II Sem (CSE & ME) comprising the Five Units and practice exercises for all the topics.

Note: Listening and Speaking skills are covered in the syllabus of ELCS Lab.

UNIT –I: Motivation
Chapter entitled ‘Presidential Address’ by Dr. A.P.J. Kalam from “Fluency in English– A Course

- **Vocabulary**: Word Formation — Root Words – The Use of Prefixes and Suffixes – Changing Words from one form to another – Transition Words - Exercises for Practice.
- **Grammar**: Punctuation – Parts of Speech- Articles – Prepositions-Types & Kinds – Exercises for Practice with focus on identifying Errors.
- **Reading**: Double Angels by David Scott-Reading and Its Importance- Techniques for Effective Reading- Signal Words- Exercises for Practice
- **Writing**: Writing Sentences- Techniques for Effective Writing– Paragraph Writing- Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices – Patterns of Writing - Cause and Effect - Classification and Division - Compare and Contrast - Definition - Description - Exemplification - Narration - Persuasion - Process - Exercises for Practice

**UNIT –II: Leadership**

Chapter entitled Satya Nadella: Email to Employees on his First Day as CEO from “Fluency in English– A Course book for Engineering Students” Published by Orient Black Swan, Hyderabad.

- **Vocabulary**: Collocations - Synonyms and Antonyms – Homonyms, Homophones, Homographs- Exercises for Practice
- **Grammar**: Verbs-Transitive, Intransitive and Non-finite Verbs –Gerund – Exercises for Practice with focus on identifying Errors.
- **Reading**: Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading – The Road Not Taken by Robert Frost — Exercises for Practice

**UNIT –III: Human Relations**

Chapter entitled The Gift of the Magi by O Henry from the Course/Study Material.

- **Vocabulary**: Introduction- A Brief History of Words – Using the Dictionary and Thesaurus– Confusables- Spellings
- **Grammar**: Tenses: Present Tense- Past Tense- Future Tense- Active Voice – Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison – Adverbs - Exercises for Practice with focus on identifying Errors.
- **Reading**: The Cuddalore Experience by Anu George - Improving Comprehension Skills – Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author’s viewpoint (Inference)
- **Anticipation**: Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions.
- **Writing**: Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- E-Correspondence – Emails – Social Networks – Dos and Don’ts.

**UNIT –IV: Human Values and Professional Ethics**

Chapter entitled ‘Good Manners’ by J.C. Hill from Fluency in English – A Course book for Engineering Students” published by Orient Blackswan, Hyderabad.

- **Vocabulary**: Phrasal Verbs - Idiomatic Expressions –One- word Substitutes – Analogies (Exercises for Practice.)
- **Grammar**: Sequence of Tenses- Concord (Subject in Agreement with the Verb) – Exercises for Practice with focus on identifying Errors.
- **Reading**: ‘If’ poem by Rudyard Kipling–Tips for Writing a Review — Author’s Viewpoint – Reader’s Anticipation— Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice – Exercises for Practice.
- **Writing**: Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., — Exercises for Practice. Introduction – Steps to Effective Précis Writing – Guidelines- Samples

**UNIT –V: Wisdom**

Chapter entitled ‘Father Dear Father’ by Raj Kinger from Fluency in English – A Course book for Engineering Students” Published by Orient Black Swan, Hyderabad

- **Vocabulary**: Foreign Words—Words borrowed from other Languages- Exercises for Practice
- **Grammar**: Direct and Indirect Speech- Question Tags- Common Errors in English - Exercises for Practice with focus on identifying Errors.
- **Reading**: Predicting the Content- Understanding the Gist – SQ3R Reading Technique- Study Skills – Note Making - Understanding Discourse - Coherence – Sequencing Sentences.
- **Writing**: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports – Formats- Prewriting – Structure of Reports (Manuscript Format) – Types of Reports – Writing the Report - Exercises from both the texts not prescribed shall be used for classroom tasks.

**References**

1. Prof. N. Krishna Swamy Modern English A Book of Grammar, Usage and Composition
2. Prof. Krishna Swamy and Sri Ram
7. English for Science and Technology by.Prof.P.Ramani, Mc Millan
8. The Structure of Technical English - A.J.Hebert, Orient Longman
9. Communication in English for Technical Students – Curriculum Development Centre, Calcutta, Orient Longman
11. Writing That Works: How to Communicate Effectively in Business by Kenneth Roman
12. Words that Sell by Richard Bayan
15. O Henry 100 Short Stories
16. Novels and Short Story collections of W. Somerset Maugham
17. Selected Writings of R.K Narayan
18. Wings of Fire by APJ Kalam
19. Literary Horizon Orient Black Swan Pvt. Ltd. 2013
20. The Gardener by Rabindranath Tagore
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

I-B.Tech.-II-Sem.  
Subject Code: 17ME1203ES  

Pre-requisite: Nil

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

1. solve electrical circuits using circuit laws and explain single phase AC circuits
2. solve electrical circuits using network theorems and illustrate diode characteristics
3. identify special purpose devices and use diode circuits for various applications
4. illustrate the configurations and biasing techniques of Bi-polar junction transistor
5. characterize JFET

UNIT-I: INTRODUCTION TO ELECTRICAL CIRCUITS & SINGLE PHASE AC CIRCUITS

Single Phase AC Circuits: R.M.S. and Average values, Form and peak factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT-II: NETWORK THEOREMS & P-N JUNCTION DIODE
Network Theorems: Thevenin’s, Norton’s, Maximum power transfer, Superposition, Reciprocity, Tellegen’s Millman’s and compensation theorems for DC and AC excitations.

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

UNIT- III: SPECIAL PURPOSE DEVICES & DIODE CIRCUITS
Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- IV: BIPOLAR JUNCTION TRANSISTOR
Transistor Biasing And Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_BE and β, Bias Compensation using Diodes and Transistors. Principle of operation of SCR.

UNIT- V: JUNCTION FIELD EFFECT TRANSISTOR
Text Books:
2. Electrical Technology Vol-I B.L. Theraja. S. Chand publications
4. Integrated Electronics – J.Millman and C.C.Halkias, Satyabrataj, TMH.

References:
2. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
7. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
ENGINNEERING GRAPHICS

I-B.Tech.-II-Sem.  
Subject Code: 17ME1204ES  
L T P C: 2 0 3 4

Pre-requisites:

- Knowledge of basic math concepts and terms like (circles, rectangles, ellipses, polygons), angles (degrees, radians), different types of symmetry (reflectional, rotational, translational), scaling, unit measurement systems etc.
- A keen eye for detail, good spatial awareness, the ability to visualize objects in three dimensions before they are on a page.

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

1. apply principles of engineering drawing in technical graphic communication
2. construct conic sections using various methods
3. draw orthographic projections of points, lines, planes and solids in various positions
4. draw development of solid surfaces
5. draw orthographic projections from given isometric projections of an object and vice versa

UNIT – I

UNIT- II

UNIT – III
Projections of Regular Solids - Auxiliary Views.

UNIT – IV
Sections and developments; Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

UNIT – V

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar

REFERENCE BOOKS:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
DATA STRUCTURES THROUGH C

I-B.Tech.-II-Sem.  
Subject Code: 17ME1205ES  

Course Outcomes: Upon completion of the course, the students will be able to
1. classify different data structures to design efficient programs
2. identify appropriate sorting and searching techniques
3. illustrate operations and applications of linear data structures
4. explain various concepts of non-linear data structures
5. choose an appropriate hashing technique for a given problem

UNIT – I  
INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING: Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

UNIT – II  
LINEAR DATA STRUCTURES: Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).

UNIT – III  
LINKED LISTS: Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; linked list representation and operations of Stack, linked list representation and operations of queue.

UNIT – IV  
NON LINEAR DATA STRUCTURES: Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary search tree, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.

UNIT – V  

Text Books:

Reference Books:
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

I-B.Tech.-II-Sem.  
Subject Code: 17ME1206HS  
L T P C  0 0 3 2

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

1. apply the sounds of English for proper pronunciation
2. use the right accent and intonation in formal and informal situations
3. distinguish and neutralize various accents for intelligibility
4. develop speaking and listening skills through audio-visual experiences
5. demonstrate employability skills through various activities

COMPUTER ASSISTED LANGUAGE LEARNING (CALL) LAB

Exercise – I
Introduction to Phonetics -Speech Sounds -Vowels and Consonants
Minimal Pairs- Consonant Clusters
Past Tense Marker and Plural Marker

Exercise – II
Structure of Syllables
Word Stress-Sentence Stress – Intonation
Basic Rules of Word Accent - Stress Shift

Exercise - III
Errors in Pronunciation-the Influence of Mother Tongue (MTI)
Common Indian Variants in Pronunciation – Differences between British and American Pronunciation

Exercise – IV
Listening for General Details
Listening Comprehension Tests

Exercise – V
Listening for Specific Details
Listening Comprehension Tests

Online Resources for Teaching Listening Skills

Listening for General & Specific Details
www.learnenglish teens.britishcouncil.org
http://learnenglish teens.britishcouncil.org/skills/listening-skills-practice
https://www.skillsyouneed.com/ips/listening-skills.html
https://www.youtube.com/watch?v=qYb0LCqqJbU
https://www.englishlistening.com/
http://esl-lab.com/
http://www.trainyouraccent.com/

Listening Comprehension Test
www.examenglish.com/IELTS/IELTS_listening.html
https://www.englishlistening.com/index.php/listen-to-passages/
www.examenglish.com/TOEFL/toefl_listening.html
INTERACTIVE COMMUNICATION SKILLS (ICS) LAB

Exercise – I
Ice-Breaking Activity - Introducing Oneself and Others
JAM Session

Exercise – II
Situational Dialogues – Greetings – Taking Leave
Role-Play- Expressions in Various Situations
Making Requests and Seeking Permissions
Telephone Etiquette

Exercise – III
Descriptions- Narrations
Giving Directions and Guidelines

Exercise – IV
Public Speaking – Exposure to Structured Talks
Non-verbal Communication
Presentation Skills
Making a Short Speech
Extempore- Making a Presentation

Exercise – V
Group Discussion- Interview Skills
Group Discussion Activity - Mock Interviews

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 facility (minimum 40 systems with multimedia) with the following specifications:
   
   i) Computers with Suitable Configuration  
   ii) High Fidelity Headphones

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 and camcorder etc.

Lab Manuals:


References:

DATA STRUCTURES THROUGH C LAB

I-B.Tech.-II-Sem.          L  T  P  C
Subject Code: 17ME1207ES  -  -  3  2

Course Outcomes: Upon completion of the course, the students will be able to
1. implement various searching and sorting techniques
2. demonstrate basic operations of stack and queues using arrays and linked lists
3. apply stack data structure to solve various computing problems
4. demonstrate and apply different methods for traversing graphs
5. construct binary search tree

WEEK-1: SEARCHING TECHNIQUES

Write C programs for implementing the following searching techniques.
   a. Linear search.
   b. Binary search.
   c. Fibonacci search.

WEEK-2: SORTING TECHNIQUES

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.
   a. Bubble sort.
   b. Insertion sort.
   c. Selection sort.

WEEK-3: SORTING TECHNIQUES

Write C programs for implementing the following sorting techniques to arrange a list of integers in descending order.
   a. Quick sort.
   b. Merge sort.

WEEK-4: IMPLEMENTATION OF STACK AND QUEUE

Write C programs to
   a. Design and implement Stack and its operations using Arrays.
   b. Design and implement Queue and its operations using Arrays

WEEK-5: APPLICATIONS OF STACK

Write C programs for the following:
   a. Uses Stack operations to convert infix expression into postfix expression.
   b. Uses Stack operations for evaluating the postfix expression.

WEEK-6: IMPLEMENTATION OF SINGLE LINKED LIST

Write a C program that uses functions to perform the following operations on single linked list.
   (i) Creation     (ii) insertion     (iii) deletion     (iv) traversal

WEEK-7: IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST

Write a C program that uses functions to perform the following operations on Circular linked list.
   (i) Creation     (ii) insertion     (iii) deletion     (iv) traversal
WEEK-8: IMPLEMENTATION OF DOUBLE LINKED LIST

Write a C program that uses functions to perform the following operations on double linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.

WEEK-9: IMPLEMENTATION OF STACK USING LINKED LIST

Write a C program to implement stack using linked list.

WEEK-10: IMPLEMENTATION OF QUEUE USING LINKED LIST

Write a C program to implement queue using linked list.

WEEK-11: GRAPH TRAVERSAL TECHNIQUES

Write C programs to implement the following graph traversal algorithms:
  a. Depth first search.
  b. Breadth first search.

WEEK-12: IMPLEMENTATION OF BINARY SEARCH TREE

Write a C program that uses functions to perform the following:
  a. Create a binary search tree.
  b. Traverse the above binary search tree recursively in pre-order, post-order and in-order.
  c. Count the number of nodes in the binary search tree.

Reference Books:

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

I-B.Tech.-II-Sem. Subject Code: 17ME1208ES

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

1. design electrical circuits to verify circuit laws and network theorems
2. verify the V-I characteristics of various electronic devices
3. determine the efficiency of various rectifiers
4. illustrate the configurations of Bi-polar junction transistor
5. demonstrate the characteristics of FET and SCR

PART A:
ELECTRICAL & ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions)

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Bread Boards,
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT’s, Low power JFET’s, Power Transistors, LED’s, LCD’s, SCR.
3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO

PART B:
(For Laboratory examination list of experiments – Minimum of 10 experiments to be conducted)

PART-1 ELECTRICAL LAB

1. Verification of KVL & KCL.
2. Verification of Superposition and Reciprocity theorems.
3. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
4. Experimental determination of Thevenin’s Theorem equivalent circuits and verification by direct test.
5. Experimental determination of Norton’s Theorem equivalent circuits and verification by direct test.

PART-2 ELECTRONICS LAB

6. Forward and reverse bias characteristics of PN-Junction Diode.
7. Zenor diode V-I characteristics and Zenor diode as voltage regulator.
8. Half wave rectifier with & without filters.
10. Input & output characteristics of Transistor in CB/CE configuration.
11. FET Characteristics.
12. SCR Characteristics.

Equipment required for Laboratory:

1. Regulated Power supplies (RPS) : 0-30 V
2. CRO’s: 0-20 MHz
3. Function Generators: 0-1 MHz
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20 µA, 0-50µA, 0-100µA, 0-200µA,10mA,20 mA
8. Voltmeters (Analog or Digital) : 0-30V,0-50V,
9. Electronic Components: Resistors, Capacitors, BJTs, SCRs, FETs, LEDs, Diodes-Ge & Si type, Transistors – NPN, PNP type
MICRO PROJECT
(MANDATORY NON-CREDIT COURSE)

Subject Code: 17AC1209MC

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

1. select problem and evaluate
2. review the literature related to the problem
3. implement principles of science and Engineering
4. analyze the problem
5. present the essence of project work

EVALUATION OF MICRO PROJECT:

1. The student has to select one suitable topic in consultation with course Counselor /advisor and get it approved and register with the Head of the Department.
2. The project is evaluated for 30 marks for internal and 70 marks for external.
3. The students shall be required to submit the rough draft of the project before the commencement of first mid examination.
4. Faculty shall make suggestions for modification in the rough draft.
5. Two copies of the final report should be submitted by the student within a week thereafter.
6. Presentation schedules will be prepared by Department in line with the academic calendar.

Guidelines for preparation and presentation of Micro Project:

The report should be prepared in the prescribed format which is available with concerned course advisor/Counselor. Similarly a 15 minutes power point presentation in a prescribed format should be given.

The evaluation of the Micro Project is based upon the following.

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II-B.TECH.-I-SEMESTER
SYLLABUS
Course Outcomes: After learning the contents of this course the student will be able to
1. differentiate among random variables involved in the probability models
2. test hypothesis for large samples
3. test hypothesis for small samples
4. solve transcendental, linear and non-linear system of equations using numerical methods
5. find the numerical solutions for first order initial value problems and integrals

UNIT- I

UNIT – II
Sampling Theory: Introduction, Population and samples, Sampling distribution of means and variances. Test of Hypothesis For Large Samples: Introduction, Hypothesis, Null and Alternative Hypothesis, Type I and Type II errors, Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means-proportions and their differences- Point estimation, Maximum error of estimate, Interval estimation.

UNIT – III
Test of Hypothesis For small Samples: Tests concerning small samples- t– Test, F-Test and $\chi^2$- Test and their properties, applications. Point estimation, Maximum error of estimate, Interval estimation.

UNIT-IV

UNIT-V

Text Books:

References:
2. Introductory Methods of Numerical Analysis by S.S. atry, PHI Learning Pvt. Ltd.
METALLURGY AND MATERIAL SCIENCE

II-B.Tech.-I-Sem.  
Subject Code: 17ME2102ES  

Prerequisites: Basic idea of bonding nature in solids and different properties of elements

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

1. explain the concepts of structure of metals and constitution of alloys
2. construct and interpret equilibrium phase diagrams
3. analyze the material properties of ferrous and non-ferrous alloys
4. apply various heat treatment methods to steels
5. outline the properties and applications of ceramic and composite materials

UNIT – I

UNIT – II

UNIT – III
Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plan carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – IV
Heat treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT – V
Ceramic materials : Crystalline ceramics, glasses, cermaets, abrasive materials, nonomaterials – definition, properties and applications of the above.

Text Books:
1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Material science & Metallurgy / Kodgire

Reference Books:
2. Materials Science / Vijendra Singh
3. Elements of Material science / V. Rahghavan
MECHANICS OF SOLIDS

II-B.Tech.-I-Sem.  
Subject Code: 17ME2103PC  

L  T  P  C  
3  1  0  3

Pre-requisites: Basics of Engineering Mechanics

Course Outcomes: Upon completion of the course, the students will be able to
1. estimate the stresses and strains in bodies of varying cross-section and Composite bars
2. sketch the shear force and bending moment diagrams for beams of various supports and loads
3. analyze flexural and shear stresses in a beam
4. evaluate principal stresses, strains and various theories of failure
5. determine the stresses and deformations in shafts and thin cylinders

UNIT-I


UNIT-II

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

UNIT-III


SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT - IV

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories of Failure: Introduction – Various theories of failure – Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

UNIT - V


Text Books:

References:
2. Strength of Materials by S. Timoshenko
THERMODYNAMICS

II-B.Tech.-I-Sem.  
Subject Code: 17ME2104BS  
L  T  P  C  4 0 0 4

Pre-requisite: Engineering Mathematics, Chemistry and Physics

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

1. explain various thermodynamic systems and processes
2. apply the basic laws of thermodynamics
3. evaluate the performance of energy conversion devices
4. determine property values during any process by using concepts of a mixture of gasses
5. analyze the thermodynamic cycles and evaluate performance parameters

Tables/Codes: Steam Tables and Mollier Chart, Refrigeration Tables

UNIT – I

UNIT – II

UNIT – III


UNIT – IV

UNIT - V
Mean Effective Pressures on Air standard basis – comparison of Cycles.

**Refrigeration Cycles:** Bell-Coleman cycle, Vapour compression cycle- Performance Evaluation.

**Text Books:**
1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Thermodynamics / C.P.Arora.

**Reference Books:**
1. Thermodynamics – An Engineering Approach – YunusCengel& Boles /TMH
3. Thermodynamics – J.P.Holman / McGrawHill
4. Engineering Thermodynamics – Jones & Dugan
5. An introduction to Thermodynamics / YVC Rao / New Age
7. Thermodynamics – Achutan – PHI.
KINEMATICS OF MACHINERY

II-B.Tech.-I-Sem.  L T P C
Subject Code: 17ME210PC  4 0 0 4

Prerequisites: Basic principles of mechanics

Course Outcomes: Upon completion of the course, the students will be able to
1. illustrate concepts of kinematics and mechanisms of machines
2. evaluate velocity and acceleration of simple mechanisms
3. explain working principle of various straight line mechanisms
4. develop cam profiles based on follower motion
5. solve problems related to gears and gear trains

UNIT – I
Mechanisms : Elements or Links – Classification – Rigid Link, flexible and fluid link –Types of kinematics pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully and incompletely constrained .
Mechanism and Machines – Mobility of Mechanisms : Grubler’s criterion, classification of machines – kinematics chain – inversions of mechanism – inversions of quadric cycle chain, single and double slider crank chains, Mechanical Advantage.

UNIT – II
Kliens construction - Coriolis acceleration - determination of Coriolis component of acceleration
Analysis of Mechanisms: Analysis of slider crank chain for displacement- velocity and acceleration of slider – Acceleration diagram for a given mechanism.

UNIT – III
Straight-line motion mechanisms: Exact and approximate copied and generated types –Peaucellier - Hart - Scott Russell – Grasshopper – Watt -Tchebicoff’s and Robert Mechanism - Pantographs
Steering gears: Conditions for correct steering – Davis Steering gear, Ackerman’s steeringgear.
Hooke’s Joint: Single and double Hooke’s joint –velocity ratio – application – problems.

UNIT – IV
Cams: Definitions of cam and followers – their uses – Types of followers and cams –Terminology – Types of follower motion - Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.
Analysis of motion of followers: Tangent cam with Roller follower – circular arc cam withstraight, concave and convex flanks.

UNIT – V
Higher pair: Friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion – velocity of sliding
Forms of teeth, cycloidal and involutes profiles – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference – expressions for arc of contact and path of contact of Pinion & Gear and Pinion & Rack Arrangements– Introduction to Helical – Bevel and worm gearing
Text Books:

1. Theory of Machines and Mechanisms/JOSEPH E. SHIGLEY/ Oxford

Reference Books:

1. Theory of Machines / Sadhu Singh / Pearson.
2. Theory of Machines / Thomas Bevan/CBS.
METALLURGY & MATERIAL SCINECE LAB

II-B.Tech.-I-Sem. 
Subject Code: 17ME2106ES 

Course Outcomes: Upon completion of the course, the students will be able to
1. interpret crystal structure, mechanical behavior of materials and necessity of alloying
2. perform metallographic methods for characterizing the micro structure of metals
3. plot the hardness variations of heat treated and non-heat treated steels
4. select appropriate materials for design
5. apply the skills and modern techniques for latest materials

LAB EXPERIMENTS

1. Preparation and study of Crystal models.
2. Study of: Specimen cutting machine Specimen mounting press Grinding and polishing equipment
3. Study of microscope working principles.
5. Preparation and study of the Microstructure of Mild steels
6. Preparation and study of the Microstructure of low carbon steels
7. Preparation and study of the Microstructure of high Csteels
9. Hardeneability of steels by Jominy End QuenchTest.
10. To study heat treatment processes (hardening and tempering) of steel specimen.
11. To find out the hardness of various treated and untreated steels.
FUELS AND LUBRICANTS LAB

II-B.Tech.-I-Sem.                                      L  T  P  C
Subject Code: 17ME2107BS                              0  0  3  2

Prerequisite: Chemistry

Course Outcomes: Upon completion of the course, the students will be able to
1. determine flash and fire point of fuels.
2. experiment with bomb calorimeter
3. determine viscosity of lubricants.
4. evaluate the percentage of carbon residue in fuel sample.
5. predict penetration depth using grease penetration test

LIST OF EXPERIMENTS

1. Determination of Flash and Fire points of Liquid fuels.
2. Determination of Flash and Fire points of Lubricants.
7. Determination of Calorific value: Gaseous fuels.
10. Viscosity determination by Saybolt methods.
MECHANICS OF SOLIDS LAB

II-B.Tech.-I-Sem. Subject Code: 17ME2108PC

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Pre-requisites: Chemistry & Physics

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

1. design and conduct experiments, acquires data, analyze and interpret data
2. analyze the behavior of the solid bodies subjected to various types of loading
3. determine the stiffness and rigidity modulus of spring
4. test the hardness of materials
5. compute the young’s modulus of different beams

List of Experiments:

1. Direct tension test
2. Bending test on Simple supported beam
3. Bending test on Cantilever beam
4. Torsion test
5. Brinell hardness test
6. Rockwell hardness test
7. Test on springs
8. Compression test on cube
9. Izod Impact test
10. Charpy Impact test
11. Punch shear test
ENVIRONMENTAL SCIENCE AND TECHNOLOGY
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-I-Sem. L T P C
Subject Code: 17HS2109MC 3 0 0 -

Pre requisites: Basic knowledge in Science & Technology

Course outcomes: Through this course the student is able to
1. identify the importance, scope and role of ecosystem in our lives
2. interpret nature of available resources and choose an inter-disciplinary approach to environmental protection
3. outline bio-diversity and its relevance to ecological balance
4. explain laws and legislations on environmental protection
5. evaluate technologies for achieving sustainable development

UNIT I: Ecosystem
Introduction to ecosystem: Definition, Scope and Importance; Classification of ecosystem; Structure and functions of ecosystem food chain, food web, ecological energetic, eco-pyramids, carrying capacity; Biogeochemical cycles (Carbon and Nitrogen Cycles), flow of energy; Institutions (BNHS, BVIEER, ZSI, BSI) Environment movement in India (MedhaPatkar, SundarlalBahuguna, Indira Gandhi, Rachael Carson).

Biotic and abiotic components–Case studies of forest/aquatic/desert ecosystem.

UNIT II: Natural Resources
Renewable and Non–renewable resources–Importance, uses, classification of natural resources(i) forest: deforestation, timber extraction & conservation (ii) water: conflicts over water, dams –benefits & effects; use and over exploitation of water resources, floods, droughts (iii) mineral :use and exploitation, effects on mining, (iv) energy resources: growing needs, renewable and non renewable energy sources, use of alternative energy (v) land resources: land degradation, landslides, soil erosion and desertification; role of an individual in conservation of natural resources and equitable use.

UNIT III: Biodiversity
Definition and levels of biodiversity, Values of biodiversity Bio– geographical classification of India; hot spots of biodiversity; India as a mega diversity nation; Threats to biodiversity; Endangered and endemic species of India; Conservation of biodiversity: In–situ and Ex–situ conservation; Case studies on conservation of biodiversity. National biodiversity Act.

UNIT IV: Environmental Pollution & Control Technologies:

UNIT V: Environmental Acts , EIA & Sustainable Development :
Textbooks:


References:

1. Environmental Science and Technology by M. Anji Reddy(2007), B.S Publications,
ANALYTICAL SKILLS
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-I-Sem.

Subject Code: 17BS2110MC

Course Outcomes: Upon completion of this course, student will be able to
1. apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
2. apply measurement techniques to data collection and utilize their innovative thinking skills to project themselves for finding fresh approaches towards tribulations
3. use the skills for effective communication
4. identify different types of arguments as well as their premises and conclusions
5. demonstrate the mathematical reasoning, including the ability to prove simple results and/or make statistical inferences

UNIT-I
Data Interpretation: Introduction to Data Interpretation, quantitative and qualitative data, Tabular Data, Line Graphs, Bar Chart, Pie Charts, X-Y Charts.

UNIT-II
Reasoning: Number Series, Letter Series, Series completion, Coding and Decoding,

UNIT-III

UNIT-IV

UNIT-V
Reasoning Ability: Blood Relations, Seating arrangements, Directions, Decision making.

TEXT BOOKS:
1. GL Barrons, Mc Graw Hills, Thorpe’s verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand, ‘A modern approach to Logical reasoning’
3. Verbal and non verbal Reasoning by S.Aggarwal
4. Analytical Reasoning by M.K.pandey
II-B.TECH.-II-SEMESTER SYLLABUS
MANUFACTURING PROCESS

II-B.Tech.-II-Sem.  
Subject Code: 17ME2201PC

Pre-requisites: Basic Mechanical Engineering

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

1. explain concepts of various casting techniques
2. differentiate various welded joints
3. distinguish the process details of soldering, brazing and welding
4. illustrate various techniques of metal working
5. distinguish various extrusion and forging techniques

UNIT – I
Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.
Methods of Melting - Crucible melting and cupola operation – Defects in castings;
Solidification of casting – Solidification of pure metal – Nucleation and grain growth, casting design considerations.

UNIT – II
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting – standard time and cost calculations. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

UNIT – III
Inert Gas Welding _ TIG Welding, MIG welding, Friction welding, induction welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non-destructive testing of welds.

UNIT – IV
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth.
Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.
Types of presses and press tools. Forces and power requirement in the above operations.

UNIT – V

Text Books:
1. Manufacturing Technology / P.N. Rao/TMH

Reference Books:
1. Production Technology / R.K. Jain
2. Metal Casting / T.V Ramana Rao / New Age
DYNAMICS OF MACHINES

II-B.Tech.-II-Sem.

Subject Code: 17ME2202PC

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

1. make use of the concepts of static and dynamic force analysis of planar mechanisms and gyroscopic effects
2. explain the importance of turning moment diagrams, fly wheels and its analysis
3. illustrate the concepts of friction-clutches, brakes and dynamometers
4. outline the working principles of different governors and examine the balancing of rotating and reciprocating masses
5. summarize free and forced vibrations

UNIT – I
Precession: Gyroscopes – effect of precession – motion on the stability of moving vehicles such as motorcycle – motorcar – aeroplanes and ships.

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

Text Books:
2. Theory of Machines, R.S.Khurmi

Reference Books:
2. Theory of Machines, Thomas Bevan, CBS Publishers
3. Theory of Machines, R.K.Bansal (Lakshmi publications)
FLUID MECHANICS & HYDRAULIC MACHINERY

II-B.Tech.-I-Sem.  
Subject Code: 17ME2203PC  
L    T    P    C  
4    0    0    4

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

1. explain the concepts of fluid statics
2. describe the concepts of fluid kinematics and dynamics
3. analyze flow through different pipes and boundary layer theory
4. select suitable turbine for given heads
5. estimate performance parameters of hydraulic machines

UNIT I
Fluid Statics: Dimensions and Units: physical properties of fluids-specific gravity, viscosity, surface tension, capillarity- vapour pressure-atmospheric, gauge and vacuum pressure- measurement of pressure- piezometer, U-Tube and Differential Manometers.

UNIT II
Fluid kinematics: stream line, path line and steak line and stream line, classification of flows steady &un steady, uniform & non uniform, laminar & turbulent, rotational &irrotational flows-equation of continuity for one dimensional flow and three dimensional flow.
Fluid dynamics: Surface & body forces, Euler’s &Bernouli’s equations for flow along a stream line, moment equation and its applications on force on pipe bend. Measurement of flow: pitot tube, venture meter and orifice meter, flow nozzle.

UNIT III
Closed conduit flow: Reynolds’s experiment, Darcy Weisbach equation, minor losses in pipes, pipes in series and pipes in parallel, total energy line-hydraulic gradient line.
Boundary layer concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivations) boundary layer in transition, separation of boundary layers submerged objects-drag and lift.

UNIT IV
Basics and hydraulic turbine turbo machinery: Hydro dynamic force on jets on stationary and moving plate, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency , flow over radial vanes.
Classification of turbines, heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine, and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design-draft tube theory-functions and efficiency.

UNIT V
Performance of hydraulic turbines and pumps: Geometric similarity, unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbines, cavitation, surge tank, water hammer.
Centrifugal pumps: Classification, working, work done-barometric head-losses and efficiencies specific speed-performance characteristic curves, NPSH.
Reciprocating pumps: Working, discharge, slip, indicator diagrams.

Text Books:
1. Fluid mechanics and hydraulic machines by R.K.Bansal.
2. Hydraulics, Fluid mechanics and hydraulic machinery by MODI and SETH.

References:
1. Fluid mechanics and fluid power engineering by D.S.Kunar, Kotaria and sons.
2. Fluid mechanics and machinery by D. Rama Durgaiah, New age international.
3. Hydraulic machines by Banga and Sharma, Khanna publishers.
MACHINE DRAWING PRACTICE

II-B.Tech - II-Sem.

Subject Code: 17ME2204PC

Pre-requisites: Engineering Drawing

Course Outcomes: Upon completion of the course, the students will be able to
1. apply the principles of engineering drawing in machine drawing
2. make use of conventional representation of materials and machine components
3. illustrate various permanent and temporary Fasteners, Joints and Couplings
4. develop assembly drawings from the given part drawing and vice versa
5. construct computer aided drawings using CAD software package

Question Paper Pattern: Question paper has two parts. Part one has five questions out of which answer three (each 10 marks). Part two has one question (assembly with three views) and it is to be answered compulsorily (it carries 50 marks)

1. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
2. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
3. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
4. Title boxes, their size, location and details - common abbreviations and their liberal usage
5. Types of Drawings – working drawings for machine parts.

Drawing of Machine Elements and simple parts: Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

6. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
7. Keys, cottered joints and knuckle joint.
8. Riveted joints for plates
9. Shaft coupling, spigot and socket pipe joint.

Assembly Drawings: Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

11. Steam engine parts – stuffing boxes, cross heads, Eccentrics.
13. Other machine parts - Screws jacks, Petrol engine connecting rod, Plummer block
14. Simple designs of 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 Book:

Reference Books:
FINANCIAL ANALYSIS, MANAGEMENT & ECONOMICS

II-B.Tech.-II-Sem.

Subject Code: 17ME2205HS  
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Prerequisites: Nil

Outcomes: Upon completion of the course, the student will be able to
1. analyze financial performance of an enterprise using final accounts and ratio
2. apply principles of management in professional career
3. make use of principles of economics for decision making
4. identify business environment and laws of demand
5. solve problems in the areas of production, cost, price and markets

UNIT - I

UNIT - II

UNIT - III

UNIT - IV

UNIT –V

Note: Student also expected to attempt following projects as a part of assignment

Project-1: Submission of a report on Recent Economic Policy Reforms in view of demonetization, IT & GST

Project-2: Submission of a report on financial performance of any listed public limited company either through its website or through website of nse.org or bse.org

Project-3: Submission of a report by visiting any organization to observe how management functions are carried out.
Text Books:
1. Varshney, Maheswari (2003), Managerial Economics, Sultan Chand, New Delhi, India.

Reference Books:
MANUFACTURING PROCESSES LAB

II-B.Tech.-II-Sem.  
Subject Code: 17ME2206PC  

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Prerequisites: Manufacturing Technology

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

1. perform the casting process in manufacturing of different types products
2. determine the properties of different types of moulding sands
3. illustrate different welding processes required for fabrication
4. test the various metal forming processes
5. make use of blow and injection moulding equipment

List of Experiments: (Minimum of 10 Exercises need to be performed)

I. METAL CASTINGLAB
   1. Pattern Design and making - for one castingdrawing.
   2. Sand properties testing - Exercise -for strengths, and permeability –1
   3. Moulding Melting and Casting - 1Exercise

II. WELDINGLAB
   1. ARC Welding Lap & Butt Joint - 2Exercises
   2. Spot Welding - 1Exercise
   3. TIG Welding - 1Exercise
   4. Plasma welding and Brazing - 2 Exercises (Water PlasmaDevice)

III. MECHANICAL PRESSWORKING
   1. Blanking & Piercing operation and study of simple, compound and progressive presstool.
   3. Bending and otheroperations

IV. PROCESSING OF PLASTICS
   1. InjectionMoulding
   2. Blow Moulding
Pre-requisites: None

Course Outcomes: Upon completion of the course, the student will be able to
1. estimate the primary and secondary forces and dynamic balancing of rotary mass system
2. analyse the response of different vibrating systems at different operating conditions
3. test the performance of governors
4. determine the effect of gyroscope for different motions
5. analyze cam profile

List of Experiments: (A Minimum of 10 experiments is to be conducted)
1. To determine the state of balance of machines for primary and secondary forces
2. To determine the frequency of torsional vibration of a given rod
3. Determine the effect of varying mass on the centre of sleeve in porter and proell governor
4. Find the motion of the follower if the given profile of the cam
5. The balance masses statically and dynamically for single rotating mass systems
6. Determine the critical speed of a given shaft for different n-conditions
7. For a simple pendulum determine time period and its natural frequency
8. For a compound pendulum determine time period and its natural frequency
9. Determine the effect of gyroscope for different motions
10. Determine time period, amplitude and frequency of undamped free longitudinal vibration of single degree spring mass systems.
11. Determine the pressure distribution of lubricating oil at various load and speed of a Journal bearing.
12. Determine time period, amplitude and frequency of damped free longitudinal vibration of single degree spring mass systems.
FLUID MECHANICS & HYDRAULIC MACHINERY LAB

II-B.Tech.-II-Sem.

Subject Code: 17ME2208PC

Pre-requisites: None

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

1. find co-efficient of discharge for the venturimeter and orifice meter
2. determine minor losses and friction factor for a given pipeline
3. verify Bernoulli’s equation
4. calculate impact of force of Jet on different types of Vanes
5. analyze the performance of various turbines and pumps

LIST OF EXPERIMENTS:

1. Verify Berboulli’sTheorm.
2. Calibration of Venturimeter.
4. Determination of friction factor for a given pipeline.
5. Determination of loss of head due to sudden contraction in pipeline.
7. Performance Test on PeltonWheel.
8. Performance Test on FrancisTurbine.
9. Performance Test on KaplanTurbine.
11. Performance Test on Multi Stage CentrifugalPump.
12. Performance Test on ReciprocatingPump.
GENDER SENSITIZATION LAB  
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-II-Sem. 
Subject Code: 17HS2209MC  
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Course outcomes: Upon completion of the course, the student will be able to
1. identify gender issues in contemporary India
2. explain gender roles, spectrum, relationships etc
3. analyze gender issues related to sexual harassment and violence
4. assess gender and human rights
5. adapt to the societal need to end prejudices and achieve gender equality

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 as Equals (Towards a World of Equals: Unit -12)
Mary Kom and onler tiler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers, Further Reading: Rosa Parks-The Brave Heart.

Unit - II

Unit - III

Unit - IV
- Further Reading: The Caste Face of Violence.

Unit - V

References:
3. NCERT History Textbook for Class IX, Ch 8: Clothing
VERBAL ABILITY
MANDATORY COURSE (NON-CREDIT)

Subject Code: 17HS2210MC

II-B.Tech.-II-Sem.  L  T  P  C

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

1. recall grammatical and basic sentence structures for communication
2. list out various vocabulary forms and improve verbal ability
3. use sentence structures without errors
4. apply the sentence structure for effective paraphrasing
5. demonstrate effective verbal skills

UNIT I
Grammar Fundamentals
Basic Sentence Structure
Parts of Speech
- The Noun
- The Adjective
- Articles
- Pronouns
- The Verb
- The Adverb
- The Preposition
- The Conjunction
- The Interjection

UNIT II
Synonyms and Antonyms, Homonyms and Homophones, Word Formation, Idioms and Phrases, Analogy. One-word Substitutes.

UNIT III
Integrated Grammar Exercises on Common Errors, Vocabulary Enhancement, Using a dictionary

UNIT IV
Paragraph writing, Essay writing, Letter Writing, E-mail Writing, Picture Description

UNIT V
Sentence Equivalence, Text Completion, Comparison and Parallelism

Activities
1. Regular practice tests.
2. Quiz, Crossword, Word-search and related activities.
3. Picture Description including Description of Photos / Images / Posters / Advertisement Analysis etc..

Text Books
2. Text for Communication Skills – Current English for Colleges by N Krishnaswamy and T.Sriram..

References
1. The Oxford English Grammar by Sidney Greenbaum.
2. English Skills for Technical Studentsby Amaresh Mukherjee, Sankarnath Ghosh and Prabir Ghosh, Orient Longman Pvt Ltd.
III-B.TECH.-I-SEMESTER SYLLABUS
THERMAL ENGINEERING – I

Subject Code: 17ME3101PC

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Pre-requisite: Thermodynamics

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

1. explain functioning of various IC engines
2. distinguish normal and abnormal combustion phenomena in IC Engines
3. express the effect of various operating variables on engine performance
4. demonstrate functioning of reciprocating, rotary and dynamic compressors
5. analyze functioning of axial flow compressors

Unit – I


Unit – II

Normal Combustion and abnormal combustion in SI engines – Importance of flame speed and effect of engine variables – Abnormal combustion, pre-ignition and knocking in SI Engines – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types of SI engines.

Four stages of combustion in CI engines – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence in Diesel engine – open and divided combustion chambers and fuel injection– Diesel fuel requirements and fuel rating

Unit- III


Classification of compressors – Fans, blowers and compressors – positive displacement and dynamic types – reciprocating and rotary types

Reciprocating Compressors: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance volume, staged compression, under cooling, saving of work, minimum work condition for staged compression

Unit – IV


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:

1. I.C. Engines / V. Ganesan- TMH
2. Thermal Engineering / Raiput / Lakshmi Publications.
3. Thermal Engineering / P.K.Nag

**Reference Books:**

2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGrawHill.
DESIGN OF MACHINE ELEMENTS – I

B.Tech. III Year I Sem
Subject Code: 17ME3102PC

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Note: Design Data books are not permitted in the Examinations. The design must not only satisfy strength criteria but also rigidity criteria.

Course outcomes: Upon completion of the course, the students will be able to

1. explain the design procedure and select materials for specific application
2. evaluate the strength, stiffness and fatigue of machine elements
3. design riveted, welded and bolted joints
4. design keys, cotters, knuckle joints
5. design shafts and couplings

Unit – I


Unit – II


Unit – III

Riveted, Welded and Bolted Joints:
Welded joints-Design of fillet welds-axial loads-circular fillet welds under bending, torsion. Welded joints under eccentric loading
Bolted joints – Types of Bolts - Design of bolts with pre-stresses – Design of Bolted joints under eccentric loading – bolts of uniform strength

Unit – IV


Unit – V

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code.
Shaft Couplings: Rigid couplings – Muff, Split muff and Flange coupling, Flexible coupling–Bushed-Pin Coupling.

Text Books:
1. Design of Machine Elements / V.B. Bhandari / Mc Graw Hill

Reference Books:
1. Design of Machine Elements / V. M. Faires / Macmillan
2. Design of Machine Elements-I / Annaiah, M.H / New Age
REFRIGERATION & AIR-CONDITIONING

III-B.Tech.-I-Sem

Subject Code: 17ME3103PC

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

1. apply the concepts of refrigeration to various systems
2. explain the methods to improve performance of vapor compression systems
3. illustrate the components of refrigeration system
4. analyze vapor absorption, steam jet refrigeration systems
5. determine cooling and heating loads in air conditioning systems

Unit – I


Unit – II


Unit III:


Unit IV:


Unit – V:


Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, deodorants, fans and blowers. Heat Pump – Heat sources – different heat pump circuits – Applications.

Text Books:
1. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai
2. Refrigeration and Air Conditioning/ Manohar Prasad Prasad/ New Age

Reference Books:
1. Refrigeration and Air Conditioning / CP Arora / TMH.
2. Principles of Refrigeration - Dossat / Pearson Education
3. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH
MACHINE TOOLS AND METROLOGY

III-B.Tech.-I-Sem
Subject Code: 17ME3104PC

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

1. explain cutting tool geometry; chip formation and forces in orthogonal cutting
2. illustrate operations of lathe, drilling, and boring machines
3. make use of the operations of milling and grinding machines
4. analyze the limits and tolerances for engineering components
5. test surface roughness of part and tool alignment of various machines

Unit – I

Unit – II
Shaping, slotting and planning machines – Principles of working – machining time calculations. Drilling and Boring Machines – Principles of working, specifications, types, and operations performed; twist drill. Types of Boring machines and applications

Unit – III
Grinding – theory of grinding – classification of grinding machines - Types of abrasives, bonds Selection of a grinding wheel
Lapping, honing and broaching machines, comparison and Constructional features, machining time calculations

Unit – IV
Limits, fits and tolerances- Unilateral and bilateral tolerance system, hole and shaft basis system. Interchangeability and selective assembly - Limit Gauges: Taylor’s principle, Design of GO and NO GO gauges Measurement of angles, Bevel protractor, and Sine bar.
Measurement of flat surfaces, straight edges, surface plates, optical flat and auto collimator

Unit – V
Screw thread measurement, Gear measurement; Machine Tool Alignment Tests on lathe, milling and drilling machines - Coordinate Measuring Machines: Types and Applications of CMM

Text Books:

Reference Books:
2. Fundamentals of Dimensional Metrology / Connie Dotson / Thomson
Course Outcomes: Upon completion of the course, the student will be able to
1. analyze impact of disasters
2. choose suitable disaster management mechanism
3. make use of appropriate measures for capacity building to reduce risks
4. develop strategies to cope up with disasters
5. build disaster management plan

Unit - I

Unit - II
Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards

Unit - III
Endogenous Hazards: Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions

Unit - IV
Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters
Infrequent events: Cyclones - Lightning - Hailstorms
Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/disasters - Floods - Droughts - Cold waves - Heal waves
Floods: Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation)
Droughts: - Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion
Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation
Biological hazards / disasters: Population Explosion.

Unit - V:
Emerging approaches in Disaster Management - Three stages
1. Pre-disaster Stage (preparedness)
2. Emergency Stage
3. Post Disaster stage - Rehabilitation
Text Books:
1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

References:
1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawan 1997
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R. K. Bhandani An overview on Natural & Man made Disaster & their Reduction, CSIR, New Delhi
OPERATIONS RESEARCH

III-B.Tech.-I-Sem
Subject Code: 17ME3105OE

Course Outcome: Upon completion of the course, the student will be able to
1. formulate and solve linear programming problem using various methods
2. solve transportation and assignment problems
3. compute sequencing and inventory model problems
4. analyze waiting lines and game theory problems by applying standard solution methods
5. evaluate replacement and dynamic programming problems by applying various methods

Unit-I

Unit-II
Assignment model: Formulation. Hungarian method for optimal solution - Solving unbalanced problem - Traveling salesman problem and assignment problem

Unit—III
Sequencing: Introduction, Flow-Shop sequencing, n jobs through two machines, n jobs through three machines, Job shop sequencing, two jobs through m machines.
Inventory: Introduction, Single item, Deterministic models - Purchase inventory models with one price break and multiple price breaks -Stochastic models - demand may be discrete variable or continuous variable - Single Period model and no setup cost.

Unit—IV
Theory of Games: Introduction, Terminology- Solution of games with saddle points and without saddle points- 2 x 2 games, dominance principle, m x 2 & 2 x n games -graphical method.
Waiting Lines: Introduction, Terminology-Single Channel-Poisson arrivals and Exponential Service times-with infinite population and finite population models-Multichannel-Poisson arrivals and exponential service times with infinite population.

Unit—V
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.

Text Books
2. Introduction to O.R/Hillier & Libermann/TMH.

Reference Books
1. Introduction to O.R /Taha/PHI.
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Open Elective-I)

III Year B.Tech I-Sem

Subject Code: 17EC3105OE

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

1. apply the fundamental concepts of measuring instruments
2. distinguish signal generators and Signal analyzers
3. make use of oscilloscopes
4. design various transducers
5. develop bridges for various measuring parameters

Unit I
Block Schematics of Measurement: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D’ Arsonval Movement, DC Current Meters, AC voltmeters and Current Meters, Ohmmeters, Multimeters. Meter protection, Extension of Range, True RMS Responding voltmeters, Specifications of Instruments

Unit II
Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators, Sweep Frequency Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square Wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

Unit III

Unit IV

Unit V

Text Books:

Reference Books:
JAVA PROGRAMMING

III-B.Tech.-I-Sem
Subject Code: 17CS3105OE

Prerequisites: A basic idea of “Computer Programming & Data Structures”

Course Outcomes: Upon completion of the course, the students will be able to
1. write simple java programs using OOP concepts
2. develop programs using inheritance and polymorphism
3. build efficient code using multithreading and exception handling
4. illustrate event handling mechanism.
5. Make use of applets and swing concepts

Unit I:
Object-oriented thinking and Java Basics
Object-oriented thinking: Need for OOP paradigm, summary of OOP concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods
Java Basics: History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, exploring String class.

Unit II:
Inheritance, Polymorphism, Packages and Interfaces
Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination. Benefits of inheritance, costs of inheritance - Member access rules, super uses, using final with inheritance, the Object class and its methods
Polymorphism- method overriding, dynamic binding, abstract classes and methods
Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages. Exploring java.io
Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

Unit III: Exception handling and Multithreading
Exception handling: Concepts of exception handling, benefits of exception handling. Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.
Multithreading: Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, daemon threads - Enumerations, auto boxing, annotations, generics. Exploring java.util

Unit IV:
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, nested and inner classes. The AWT class hierarchy, user interface components- labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, Layout Managers- Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

UNIT V:
Applets and Swings
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
Swings – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, ImageIcon, JLabel, JTextfield, JButton, JCheckbox, JList, JRadiobutton, JComboBox, JTabbedPane, JScrollPane, JTree and JTable.

Text Books:
1. Java the complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

References:
1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
4. An introduction to Java programming and object oriented application development, Richard A. Johnson.
THERMAL ENGINEERING LAB

III-B.Tech-I-Sem Subject Code: 17ME3106PC

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Pre-Requisite: Thermodynamics

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

1. construct valve timing diagram and test the performance of IC engines
2. determine engine frictional power by motoring, retardation and Morse tests
3. conduct economical speed test, heat balance test, air fuel ratio and volumetric efficiency of IC engines
4. estimate the efficiency of reciprocating air compressor
5. study the various parameters of boilers and identify the parts of a engine by disassemble and reassemble

LIST OF EXPERIMENTS: (A Minimum of 10 experiments are to be conducted)

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test for 4 Stroke SI engines
3. I.C. Engines Performance Test for 2 Stroke SI engines
4. I.C. Engines Morse, Retardation, Motoring Tests
5. I.C. Engines Heat Balance – CI/SI Engines
6. I.C. Engines Economical speed Test on a SI engine
7. I.C. Engines effect of A/F Ratio in a SI engine
8. Performance Test on Variable Compression Ratio Engine
9. IC engine Performance Test on a 4S CI Engine at constant speed
10. Performance Test on Reciprocating Air – Compressor Unit
11. Dis-assemble / Assembly of Engines
12. Study of Boilers
MACHINE TOOLS LAB

III-B.Tech.-I-Sem

Course Code: 17ME3107PC

Course Outcomes: Upon completion of the course, the student will be able to
1. perform step turning, taper turning, thread cutting, drilling and tapping operations on lathe
2. develop simple features by performing operations on shaper, planer and milling machines
3. measure the bores by internal micrometers and dial bore indicators
4. determine the angle and taper using Bevel protractor and Sine bar
5. evaluate screw thread parameters

List of Experiments:
1. Introduction of general purpose machines - Lathe, Drilling machine, Milling machine, Shaper,
2. Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
3. Step turning and taper turning on lathe machine
4. Thread cutting and knurling on - lathe machine.
5. Drilling and Tapping
6. Shaping and Planning
7. Slotting
8. Milling
9. Cylindrical Surface Grinding
10. Grinding of Tool angles.
ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB

III-B.Tech-I-Sem

Subject Code: 17ME3108HS

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

1. assess and utilize vocabulary in an effective way
2. interpret interpersonal relationships
3. elaborate academic reading and writing skills
4. formulate appropriate communication techniques both in formal and informal contexts
5. adapt to different work-place and socio-cultural scenarios

1. Inter-personal Communication and Building Vocabulary - Starting a Conversation—Responding appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.
2. Reading Comprehension –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, , Skimming, Scanning, Inferring Meaning.
4. Presentation Skills – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ e-mails/Assignments… etc.,

References:
HUMAN VALUES AND PROFESSIONAL ETHICS
MANDATORY COURSE (NON-CREDIT)

III-B.Tech-I-Sem
Subject Code: 17HS3109MC

Course Outcomes: Upon completion of the course, the student will be able to
1. apply the importance of human values for personal and societal development
2. develop ethics and professional attitude
3. explain ethical standards in a professional environment
4. distinguish between professional rights and employee rights
5. identify their role in professional spheres

Unit I

Unit II

Unit III

Unit IV
Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Monitoring and control- Mini-Cases

Unit V
Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – Negotiating taxes - Mini-Cases

References
Course Outcomes: Upon completion of the course, the students will be able to
1. Recall the basics of number systems and apply them accordingly
2. Apply the concepts of percentages, profit and loss, & Interests in real life situations
3. demonstrate various principles related to Distance, speed, time and work in solving mathematical problems
4. Distinguish between permutations and combinations, clocks and calendars for solving problems
5. Apply principles of geometry and menstruation to achieve qualitative results at workplace.

Unit-I
Number Systems - Basic Concepts, Number Systems: Natural numbers, whole numbers, integers, fractions (proper, improper, mixed, split), Rational Numbers, Irrational Numbers, Real Numbers.
Divisibility Rules, Logic Equations, Two digit numbers, three digit numbers, successive divisions, basic operations (addition, subtraction, multiplication, division) Averages.
Basic Concepts combined mean, average principles, wrong values taken, number added or deleted, average speed.

Progressions & Inequalities
Basic Concepts, Types: arithmetic, geometric, harmonic progression and applications.

Unit-II
Percentages
Basic Concepts, conversions, finding percentages from given numbers, quantity increases or decreases by given percentage, population increase by given percentage, comparisons, consumption when a commodity price increase or decrease and applications Profit and Loss.
Basic Concepts, discounts, marked price and list price, dishonest shopkeeper with manipulated weights, successive discounts etc
Interest (Simple and Compound)
Basic Concepts, Yearly, Half-yearly, and quarterly calculations, multiples, differences between simple and compound interest.

Ratio and Proportion
Basic Concepts of ratio and proportion, continued or equal proportions, mean proportions, invest proportion, alternative proportion, division proportion, compound proportion, duplication of ratio, finding values, coins and currencies, etc

Unit-III
Speed, Time and Distance: Basic Concepts, Single train problems, two train problems: some point same side, some point opposite sides, relative speed, different points meeting at common points, different points same side (different timings vs. same timings), ratios, number of stoppages, average speed, etc.
Time and Work: Basic Concepts, comparative work, mixed work, alternative work, middle leave and middle join, ratio efficiency.

Unit-IV
Permutations and combinations
Basic Concepts, differences between permutations and combinations, always together-never together, alternative arrangement, fixed positions, double fixations, items drawing from a single group, items drawing from a multiple group, total ways of arrangement with repetitions and without repetitions, dictionary, handshakes or line joining between two points or number of matches, sides and diagonals, etc.
Clocks and Calendars: Basic Concepts, Angle between minute hand and hour hand, reflex angle, hours hand angle, time gap between minute hand and hour hand, relative time: coincide, opposite sides and right angle, mirror images, faulty clock (slow/fast), miscellaneous, calendar.

Unit-V
Geometry and Mensuration: Basic concepts, types of angles, Plane figures: rectangles, squares,
triangles, quadrilateral, areas, perimeters, etc
Solid figures: cubes, cuboids, spheres, cylinders-area (total or lateral surface area), volumes, perimeters.
Others: Parallelogram, Rhombus, Trapezium, Circle, Sector, Segment, Cone, Sphere, Hemisphere, Ellipse, Star prism etc

Text Books:
1. GL Barrons, Mc Graw Hills, Thorpe’s verbal reasoning, LSAT Materials
3. R S Agarwal, S Chand, ‘A modern approach to Logical reasoning’
4. R S Agarwal, S Chand, ‘Quantitative Aptitude’
5. Quantitative Aptitude - G. L BARRONS
III-B.TECH.-II-SEMESTER SYLLABUS
THERMAL ENGINEERING - II

III-B.Tech-II-Sem

Subject Code: 17ME3201PC

Pre-requisite: Thermodynamics

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

1. interpret Rankine cycle and explain the working of boilers and its performance parameters
2. estimate the performance of steam nozzles
3. evaluate the performance of steam turbines
4. outline the working of steam condensers, gas turbines and their performance parameters
5. assess the performance of turbo jet engines

Unit-I
Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating.

Unit-II
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

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

Unit-V

Textbooks:
2. Gas turbines – V Ganesan – TMH.

References:
HEAT TRANSFER

III-B.Tech-II-Sem
Subject Code: 17ME3202PC

Pre-requisite: Thermodynamics;

Course Outcomes: Upon completion of the course, the student will be able to
1. identify different modes of heat transfer and compute one dimensional steady state heat transfer
2. solve transient heat conduction problems for simple geometries
3. analyze forced and natural convective heat transfer
4. design heat exchangers using LMTD and NTU methods
5. explain the principles of boiling and radiation

Unit-I
Introduction: Modes and mechanisms of heat transfer: Basic laws of heat transfer – simple general discussion about applications of heat transfer.

Conduction Heat transfer: Fourier rate equation – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates. Simplification and forms of the field equation – steady, unsteady and periodic heat transfer-initial and boundary conditions.

One dimensional Steady state conduction Heat transfer: Homogeneous slabs, hollow cylinders and sphere - composite systems - overall heat transfer coefficient - Electrical analogy - Critical radius of insulation.

Unit-II
One Dimensional Transient Conduction Heat Transfer: Variable Thermal conductivity-systems with heat sources or Heat generation-extended surfaces (fins) heat transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature.

Unit-III
Convective Heat Transfer: Classification of system based on causation of flow, condition of flow, configuration of flow and medium of flow – dimensional analysis as a tool for experimental investigation- Buckingham Pi Theorem and method, application for developing semi – empirical non – dimensional correlation for convection heat transfer – significance of non-dimensional numbers – concepts of continuity, Momentum and energy equations-Integral method as approximate method.

Forced convection: External flows - concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer – Flat plates and cylinders.

Unit-IV
Internal Flows: Concepts about hydrodynamic and thermal entry lengths – Division of internal flow - use of empirical relations for horizontal pipe flow and annulus flow.

Free convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate use of empirical relations for vertical plates and pipes.


Unit-V

Textbooks:
2. Heat Transfer, P. K. Nag, TMH.

References:
1. Fundamentals of Heat and Mass Transfer – Cengel and Ghajar - TMH.
DESIGN OF MACHINE MEMBERS – II

III-B.Tech-II-Sem
Subject Code: 17ME3203PC

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Note: Design Data Book is permitted. Design of all components should include design for strength and rigidity apart from engineering performance requirements.

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

1. analyse the importance of sliding contact bearings
2. design the different types of rolling contact bearings
3. explain the concepts of springs and power transmission systems.
4. design different categories of engine parts.
5. evaluate the design procedure for gears and power screws

Unit-I

Sliding contact bearings: Types of Journal bearings – Lubrication – Bearing Characteristic Number and Bearing Modulus – Full and partial bearings – Clearance ratio – Heat Generated and dissipation of bearings, journal bearing design, Properties of Sliding Contact Bearing, Bearing materials.

Unit-II

Rolling contact bearings: Types of Rolling Contact bearings, Ball and roller bearings – Static load – dynamic load – equivalent radial load – Reliability of a Bearing - design and selection of ball & roller bearings.

Unit-III


Belts & Pulleys: Transmission of power by Belt and Rope ways, Transmission efficiencies, Belts – Flat and V types, Ropes Drive.

Unit-IV

IC Engine Parts: Piston- Forces acting on piston – Construction, Design and proportions of piston. Connecting Rod: Thrust in connecting rod – stresses due to whipping action on connecting rod ends.

Unit-V

Gears: Spur gears & Helical gears- Brief introduction involving important concepts – Design of gears using AGMA procedure involving Lewis and Buckingham equations. Check for dynamic and wear considerations.


Textbooks:
1. Machine tool design, V.B. Bhandari, TMH.

References:
3. Design of Machine Elements, Sharma and Purohit, PHI.

Data Books:
GLOBAL WARMING & CLIMATE CHANGE
(Open Elective – II)

III-B.Tech.-II-Sem.  L  T  P  C
Subject Code: 17CE3204OE  3  0  0  3

Pre Requisites: Environmental science

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

1. describe the various consequences of climate change
2. interpret the uncertainties associated with climate change and other consequences
3. analyze the causes for climate change and its impacts on various sectors
4. evaluate the impacts in adaptation and strategies on global warming and climate change
5. explain mitigation by which these impacts can be reduced

Unit – I
Global warming and Greenhouse gases – GHGs trend, Global temperature trend, Global distribution of emissions, IPCC Sources of CO2 in the Land, Ocean and atmosphere. The Climate system – Sun, Atmosphere, Ocean, Ice and energy balance of the earth. History of climate change – glacial cycle, interglacial, interstadial events, year to decadal
Global Warming Potential: Introduction to the calculation of GWP, carbon emissions from fossil fuels and global carbon cycle, carbon intensity of fossil fuels, Effects of energy efficiency on carbon intensity, target CO2 levels.

Unit – II

Unit – III

Unit – IV
Weather and Climate – Climatic zones, continental & maritime climates; Climate change and variability – Natural changes and anthropogenic causes of climate change, Climate feedbacks – Ice-albedo, cloud - albedo and CO2 feedbacks; Present day Climate variability – El Nino and ENSO events. Climate Change Adaptation And Mitigation Measures: Adaptation Strategy/Options in various sectors – Water – Agriculture – Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key

Unit – V
Textbooks:
2. Kuhn, T.S., 1962 and updates. The Structure of Scientific Revolutions
3. Contemporary Climatology, by Peter J. Robinson and Ann Henderson-Sellers.

References:
2. Global Warming The Complete Briefing by John T Houghton
3. Intergovernmental Panel on Climate Change, (Cambridge University 2007)
FUNDAMENTALS OF ROBOTICS
(Open Elective – II)

III-B.Tech-II-Sem

Subject Code: 17ME3204OE

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

1. illustrate principles and functioning of the robot
2. perform kinematic analysis for end-effector positioning
3. integrate mechanical and electrical hardware for robot with feedback control
4. design control laws for a robot
5. develop robot programming for various applications

Unit-I

Introduction to Robotics: Types and components of a robot, Classification of robots, classification with respect to geometrical configuration (anatomy), closed-loop and open-loop control systems. Social issues and safety.

Unit-II

Robot Kinematics: Kinematics systems, Definition of mechanisms and manipulators, Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, Homogeneous Coordinate representation, DH parameters.

Unit-III


Unit –IV


Unit-V

Control Hardware and Interfacing: Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

Textbooks:

References:
PRINCIPLES OF COMMUNICATION SYSTEMS
(Open Elective – II)

III -B.Tech.-II-Sem

Subject Code: 17EC3204OE

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

1. outline the fundamentals of communication systems
2. analyze various analog modulation and demodulation schemes
3. explain sampling theorem, pulse modulation and multiplexing techniques
4. illustrate digital modulation schemes
5. develop source and channel coding techniques

Unit-I

Fundamentals of communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, calculation of noise in linear systems, and noise figure.

Unit-II

Methods of Modulation: Need for modulation; Types of modulation, generation and detection of AM, DSB-SC, SSB-SC. Angle modulation: frequency & phase modulations, Narrow band and Wide band FM, comparison of AM, FM & PM.

Unit-III

Pulse Modulations: Sampling theorem, Nyquist criteria, introduction to PAM, PWM and PPM.

Multiplexing techniques: TDM, FDM, asynchronous multiplexing.

Unit-IV

Digital Communication: Advantages; Working principle of PCM; comparison of PCM, DM, ADM, ADPCM; introduction to digital modulation techniques-ASK, FSK, PSK, DPSK, QPSK.

Unit-V

Information Theory: Concept of information; rate of information and entropy; Coding efficiency-Shanon-Fano and Huffman coding; introduction to error detection and correction codes.

Textbooks:


References:

DATABASE MANAGEMENT SYSTEMS
(Open Elective – II)

III-B.Tech- II Sem
Subject Code: 17CS3204OE

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

1. design databases using E-R model
2. construct database using relational model
3. formulate SQL queries to interact with database
4. make use of transaction control commands
5. apply normalization on database to eliminate redundancy

Unit-I

Introduction to Database Systems: Introduction and applications of DBMS, Purpose of data base, History of database, Database architecture - Abstraction Levels, Data Independence, Database Languages, Database users and DBA.

Introduction to Database Design: Database Design Process, Data Models, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, Generalization, Specialization, Aggregation, Conceptual design with the E-R model for large Enterprise.

Unit-II

Relational Model: Introduction to the relational model, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design: E-R to relational, Introduction to views, Destroying/altering tables and views.

Unit-III

Part-A: SQL Basics: DDL, DML, DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, in operator.

Part-B: Functions: Aggregate functions, Built-in functions - numeric, date, string functions, set operations.

Unit-IV

Sub-queries: Introduction, correlated sub-queries, use of group by, having, order by, join and its types, Exist, Any, All, view and its types.

Transaction control commands: ACID properties, concurrency control, Commit, Rollback, save point, cursors, stored procedures, Triggers.

Unit-V

Normalization: Introduction, Normal forms - 1NF, 2NF, 3NF, BCNF, 4NF and 5NF, concept of De-normalization and practical problems based on these forms.

Textbooks:
AUTOMOBILE ENGINEERING
(Professional Elective-I)

III-B.Tech.-II-Sem.

Subject Code: 17ME3205PE

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Pre requisites: Thermal Engineering

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

1. explain various components of the automobile and its functions
2. outline the cooling and electrical systems in automobile
3. illustrate the transmission system and function of its elements
4. demonstrate the elements of braking and steering systems
5. summarize the emission control methods used in automobiles

Unit-I


Unit-II


Unit-III


Unit-IV

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes. Steering System: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

Unit-V

Textbooks:

References:
3. Automotive Engines, Srinivasan.
NANOTECHNOLOGY
(Professional Elective-I)

III-B.Tech.-II-Sem.

Subject Code: 17ME3206PE

Course Outcomes:
After completion of this course the students will be able to:
1. describe nano materials based on their dimensionality.
2. correlate properties with structures of nano materials
3. summerize bottom up and topdown approaches for developing nano materials.
4. choose characterization techniques and study the nano material properties.
5. relate fields of nanotechnology in specific applications.

Unit – I

Unit - II

Unit – III

Unit – IV

Unit-V

Text Books:

References Books:
3. Transport in Nano structures-David Ferry, Cambridge University press 2000
AUTOMATION IN MANUFACTURING
(Professional Elective-I)

III-B.Tech-II-Sem

Subject Code: 17ME3207PE

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Pre-Requisites: Machine Tools, CAD/CAM

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

1. illustrate the fundamentals of CNC part programming
2. explain CNC machine elements and system devices
3. make use of tooling, cooling and fixturing systems for CNC machines
4. create various Rapid Prototyping data files
5. outline the various applications of Rapid Prototyping

Unit-I

Unit-II

Unit-III
Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system.
Modular fixturing, quick change cooling system, automatic head changers.

Unit-IV

Unit-V

Textbooks:

References:
2. Mechatronics-HMT, TMH.
MECHANICS OF COMPOSITE MATERIALS
(Professional Elective-I)

III-B.Tech-II-Sem
Subject Code: 17ME3208PE

Pre requisites: Deformable Body Mechanics

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

1. explain the applications of composite materials
2. illustrate the concepts of fiber reinforced plastic processing
3. differentiate micro and macro mechanics of composite lamina
4. apply failure criteria and critically evaluate the results
5. analyze the mechanical behavior of metal matrix composites

Unit- I

Unit-II
Fiber Reinforced Plastic Processing: Lay up and curing, fabricating process, open and closed mould process, hand lay up techniques; structural laminate bag molding, production procedures for bag molding; filament winding, pultrusion, pulforming, thermo-forming, injection molding, blow molding.

Unit-III
Macro Mechanics of a Lamina: Hooke's law for different types of materials, Number of elastic constants, Two - dimensional relationship of compliance and stiffness matrix.

Unit-IV
Biaxial Strength Theories: Maximum stress theory, Maximum strain theory, Tsai-Hill theory, Tsai, Wu tensor theory, Numerical problems.
Macro Mechanical Analysis of Laminate: Introduction, code, Kirchoff hypothesis, CL T, A, B, and D matrices (Detailed derivation), Special cases of laminates, Numerical problems.

Unit-V

Textbooks:

References:
HEAT TRANSFER LAB

III-B.Tech-II-Sem

Subject Code: 17ME3209PC

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

1. find thermal conductivity of common metallic materials
2. determine the amount of heat transfer between fluid and solid boundaries
3. estimate the amount of heat exchanged between fluids in heat exchangers
4. determine the emissivity and Stefan Boltzmann constant for radiation
5. evaluate heat transfer coefficient in natural, forced convection and analyze simple heat transfer systems

List of Experiments (perform any 12 experiments):

1. Composite Slab Apparatus – overall heat transfer coefficient
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
7. Heat transfer in forced convection apparatus
8. Heat transfer in natural convection
9. Parallel and counter flow Heat Exchanger
10. Emissivity apparatus
11. Stefan Boltzmann apparatus
12. Critical heat flux apparatus
13. Study of heat pipe and its demonstration
14. Film and Drop wise condensation apparatus
PRODUCTION DRAWING PRACTICE

III-B.Tech-II-Sem

Subject Code: 17ME3210PC

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

2. explain the concepts of conventional representation of machine components
3. apply limits, fits and tolerances for a given part drawing
4. represent the types of surface roughness and various treatment indications
5. create detailed part drawings including tolerances from assembly using CAD
6. create drawing of parts from assembly using CAD software

Unit – I
Conventional representation of materials: Conventional representation of parts – Screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – Methods of indicating notes on drawings.
Limits, Fits & Tolerances: Types of fits, exercises involving selection / Interpretation of fits and estimation of limits from table

Unit – II
Form & Positional Tolerances: Introduction and indication of form and positional tolerances on drawings, types of run out, total run out and their indication

Unit – III
Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing Processes, recommended surface roughness on mechanical components. Heat treatment and surface treatment symbols used on drawings

Unit – IV
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 CAD software

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

References:
**Course Outcomes**: Upon completion of the course, the student will be able to

1. identify methods and devices for measurement of length
2. Make use of methods and devices for measurement of angle
3. measure gear parameters
4. compare pitch and flank angle of a screw thread with standard gauge
5. experiment with tool maker’s microscope

**List of Experiments**

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Alignment test on the lathe.
5. Study of Tool makers microscope and its application
6. Angle and taper measurements by Bevel protractor.
7. Angle and taper measurements by Sine bar.
8. Use of spirit level in finding the flatness of surface plate.
9. Use Optical Flats in finding flatness of surface plate.
10. Thread measurement by Two wire/Three wire method.
SOFT SKILLS
MANDATORY COURSE (NON-CREDIT)

III-B.Tech-II-Sem
Subject Code: 17HS3212MC

Course Outcomes: Upon completion of this course, the student able to
1. identify the need for self awareness and exhibit professional attitude
2. interpret and improve in personal and professional communication
3. develop leadership skills and enhance the employability
4. recognize the importance of decision making and change management to improve professional attributes
5. apply interview techniques for overall development

Unit I

Unit II
Synonyms and Antonyms - Homonyms and Homophones - Word Formation - Idioms and Phrases – Analogy - One-word Substitutes.

Unit III
Errors in English, Vocabulary Enhancement, Using a dictionary

Unit IV
Paragraph writing, Essay writing, Letter Writing, E-mail Writing, Picture Description

Unit V
Sentence Equivalence, Text Completion, Comparison and Parallelism

Activities
- Regular practice tests.
- Quiz, Crossword, Word-search and related activities.
- Picture Description

TEXT BOOKS
1. Essential English Grammar by Raymond Murphy
2. High School English Grammar and Composition by Wren and Martin

References
1. The Oxford English Grammar by Sidney Greenbaum.
2. English Skills for Technical Studentsby Amaresh Mukherjee, Sankarnath Ghosh and Prabir Ghosh, Orient Longman Pvt Ltd.
3. Basis of Communication in English by Francis Soundararaj.
4. Verbal Ability and Reading Comprehension for the CAT by Nishit K Sinha.
IV-B.TECH.-I-SEMESTER SYLLABUS
Course Outcomes: Upon completion of the course, the student will be able to

1. describe various CAD devices, software and coordinate systems
2. apply homogeneous transformations on various geometric models
3. construct both analytical and synthetic entities using parametric representations
4. build surface models using different representation schemes
5. create solid primitives using the different representation schemes

Unit—I
Fundamentals of CAD/CAM: Product cycle, CAD/CAM process, CAD/CAM tools, Benefits of CAD/CAM, CAD/CAM hardware: basic structure, CPU, memory types, Computer peripherals for CAD: Design workstation, Graphic terminal, and CAD software: definition of system software and application software, CAD database and structure.

Geometric Modeling: 3-D wire frame modeling, wire frame entities and their definitions, Interpolation and approximation of curves, Concept of parametric and non-parametric representation of curves, Synthetic curves: Cubic spline, Bezier, and B-spline.

Unit—II
Surface modeling: Surface frame entities and their definitions, Parametric space of surface, parameterization of surface patch, Plane surface, Tabulated Cylindrical surface, Ruled surface, Surface of revolution, Blending surface, Hermite bicubic surface, Bezier surface. Solid Modeling: Solid entities, Boolean operations, Sweep representation, Constructive solid geometry, Boundary representations.

Unit — III
NC Control: Definition, Elements of NC system, NC procedure, NC coordinate system, NC modes, applications and advantages of NC system. NC part programming: Methods of NC part programming, Manual part programming (examples of 2D machining and Turning problems), Computer assisted part programming (examples of APT programming problems with 2D machining only), Post Processor, NC part programming languages, CNC, DNC and Adaptive Control Systems. Features of machining center, turning center

Unit —IV
Group Technology: Part families, Parts classification and coding, Production flow analysis, advantages and limitations. Computer aided process planning: Difficulties in traditional process planning, retrieval type, generative type and Hybrid type of CAPP.

Unit—V

Text Books
1. CAD/CAM /Groover M.P/Pearson education.
2. CAD/CAM Concepts and Applications/ Alavala/ PHI.

Reference Books
1. CAD/CAM Principles and Applications/P.N.Rao/ TMH.
2. CAD/CAM Theory and Practice/ Ibrahim Zeid and R.Sivasubramanian/TMH.
3. CAD/CAM/CIM/Radhakrishnan and Subramanian/New Age.
INSTRUMENTATION & CONTROL SYSTEMS

Prerequisite: Mathematics-I, Thermodynamics, Basic of Electrical and electronic Engineering.

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

1. explain principles of measurement systems, dynamic performance characteristics and sources of error
2. make use of various displacement, temperature and pressure measuring instruments
3. choose various speed, flow, acceleration & vibration measuring instruments
4. select various stress strain, humidity, force, torque and power measuring instruments
5. outline various control system methods and position controllers application

Unit-I
Definition-Basic principles of measurement-measurement systems, generalized configuration and functional descriptions of measuring instruments- examples Dynamic performance characteristics-sources of error, classification and elimination of error.

Unit-II
Measurement of Displacement: Theory and construction of various transducers to measure displacement- piezo electric, inductive, capacitance, resistance, ionization, and photo electric transducers, calibration procedures.
Measurement of Temperature: Classification-Ranges- Various Principles of measurement-Expansion, Electrical Resistance- Thermistor- Thermocouple- Pyrometers- Temperature Indicators.
Measurement of Pressure: Units- Classification- different principles used. Manometers Piston, Bourdon Pressure Gauges, Bellows-Diaphragm gauges, Low Pressure Measurement- Thermal Conductivity Gauges- ionization Pressure Gauges, Mcleod pressure Gauge.

Unit-III
Measurement of Level: Direct Method- Indirect Methods- capacitative, ultrasonic, magnetic, Cryogenic fuel level indicators Indicators- Bubbler level indicators.
Measurement of Speed: Mechanical Tachometers- Electrical Tachometers- Stroboscope, Non-contact type of Tachometers.

Unit-IV

Unit-V
Elements of Control systems: Introduction, Importance-Classification- Open and closed systems servomechanisms- Examples With Block Diagrams- Temperature, Speed and Position Control systems.

Text books:
2. Instrumentation, measurement and Analysis by B.C nakra and K,K Choudhary,TMH

References:
1. Instruments and Control systems, S.bhaskar, Anuradha Agencies.
2. Experimental methods of engineers, Holman.
Course Outcomes: Upon completion of the course, the student will be able to

1. explain the fundamentals of FEM
2. solve the linear equations of truss elements, beam elements using FEM
3. evaluate the load and displacements for 2-D problems
4. apply the FE method for heat transfer problems
5. demonstrate the dynamic analysis for various objects using FEM

Unit-I


Unit-II

Analysis of Trusses: Stiffness Matrix for Plane Truss Elements, Stress Calculations and problems.
Analysis of Beams: Element stiffness matrix for two noded, two degrees of freedom per node beam element and simple problems.

Unit-III

Finite element modeling of two-dimensional stress analysis with constant strain triangles and treatment of boundary conditions, Estimation of Load Vector, Stresses.

Finite element modeling of Axi-symmetric solids subjected to Axi-symmetric loading with triangular elements. Two dimensional four noded Iso-parametric elements and problems.

Unit-IV

Steady State Heat Transfer Analysis: One dimensional analysis of slab, fin and two-dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

Unit-V

Dynamic Analysis: Formulation of finite element model, element - Mass matrices, evaluation of Eigen values and Eigen vectors for a stepped bar, truss. Finite element - formulation to 3 D problems in stress analysis, convergence requirements, Mesh generation, techniques such as semi-automatic and fully Automatic use of softwares such as ANSYS, NISA, NASTRAN, etc.

Textbooks:
1. Introduction to Finite element analysis, S.Md.Jalaludeen, Anuradha Publications, Print-2012
2. Finite Element Methods: Basic Concepts and applications, Alavala, PHI.

References:
1. Introduction to Finite Elements in Engineering, Chandrupatla, Ashok and Belegundu, PHI.
2. Finite Element Method, Zincowitz, TMH.
ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective – III)

IV-B.Tech.-I-Sem.
Subject Code: 17CE4104OE

Pre Requisites: Environmental Science

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

1. identify the attributes to be considered for EIA
2. assess impact of deforestation
3. interpret impact prediction, significance of soil quality and mitigation
4. conduct environmental audit and prepare reports
5. illustrate environmental policies and provisions

Unit-I


Unit-II

Assessment of impact of development activities on vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Unit-III

Procurement of relevant soil quality, impact prediction, assessment of impact significance. Identification and incorporation of mitigation measures for enhancement of soil quality.

Unit-IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

Unit-V


Textbooks:
1. Environmental Pollution by R.K. Khitoliya S. Chand.

References:
1. Larry Canter – Environmental Impact Assessment, TMH.
PRINCIPLES OF ENTREPRENEURSHIP  
(Open Elective – III)

IV-B.Tech. I-Sem.  
Subject Code: 17ME4104OE  
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Course Outcomes: Upon completion of the course, the student will be able to

1. illustrate concept & types of entrepreneurship
2. distinguish individual and corporate entrepreneurship
3. identify the process of launching new ventures
4. assess legal challenges of entrepreneurship
5. build entrepreneurial strategies

Unit-I: Entrepreneurship
Case: From candle seller to CEO (Arya Kumar P.No. 48).

Unit-II: Individual and corporate entrepreneurship
The entrepreneurial journey - Stress and the entrepreneur- the entrepreneurial ego-  
Entrepreneurial motivations - Corporate Entrepreneurial Mindset the nature of corporate entrepreneur.  
Case: Globalizing Local Talent, (B. Janakiram, M. Rizwana, page 228).

Unit-III: Launching Entrepreneurial Ventures
Case: creativity in start-ups (Arya Kumar Page 166).

Unit-IV: Legal challenges of Entrepreneurship
Intellectual Property Protection-Patents, Copyrights, Trademarks and Trade Secrets-Avoiding Pitfalls- Formulation of the entrepreneurial Plan- The challenges of new venture start-ups.  
Case: Tata Motors – Nano (Arya Kumar P.No. 279).

Unit-V: Strategic perspectives in entrepreneurship
Strategic Planning-Strategic actions-strategic positioning-Business stabilization-Building the adaptive firms-understanding the growth stage-unique managerial concern of growing ventures.  
Case: To Lease or Not: A Cash flow Question (David H.Holt, Page 452).

References:
PRINCIPLES OF EMBEDDED SYSTEMS  
(Open Elective – III)

IV - B.Tech. - I-Sem  
Subject Code: 17EC4104OE  
L T P C  3 - - 3

Course Outcomes: After completion of this course the students will be able to

1. outline the basic concepts of embedded computing
2. illustrate the architecture of 8051 microcontroller
3. develop embedded programs using 8051 microcontroller
4. interface 8051 microcontroller with peripherals
5. explain real time operating system concepts

Unit-I
Embedded computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

Unit-II
The 8051 architecture: Introduction, 8051 microcontroller hardware, input / output ports and circuits, external memory, counter and timers, serial data input / output, interrupts.

Unit-III
Basic assembly language programming concepts: The assembly language programming process, programming tools and techniques, programming the 8051.
Instructions set: Data transfer and logical instructions, arithmetic operations, decimal arithmetic. Jump and call instructions.

Unit – IV
Applications: Interfacing with keyboards, displays, D/A and A/D conversions, multiple interrupts, serial data communication.

Unit – V
Introduction to real - time operating systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Textbooks:

References:
1. Microcontrollers, Raj kamal, Pearson Education.
2. An Embedded Software Primer, David E. Simon, Pearson Education.
Course Outcomes: Upon completion of the course, the student will be able to

1. design web pages using HTML and JavaScript
2. develop web applications using PHP
3. make use of XML and DTD for web design
4. build web applications using servlets and session tracking
5. establish database connectivity using JSP and JDBC

Unit-I
Web: Introduction, Internet and web, web browsers, web servers, protocols.
HTML: Basics, elements, attributes, tags- list, tables, images, forms, frames, cascading style sheets.
JavaScript: Introduction to scripting, control structures, conditional statements, arrays, functions, objects.

Unit-II
PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls, handling file uploads, connecting to database, executing simple queries, handling sessions and cookies, file handling.

Unit-III
XML: Basics of XML, Elements, Attributes, Name space, Parsing: DOM and SAX Parsers.
Introduction to DTD: internal and external DTD, Elements of DTD, DTD Limitations, XML Schema, Schema structure, XHTML.

Unit-IV
Servlets: Introduction, Lifecycle, Generic and HTTP servlet, passing parameters to servlet, HTTP servlet Request & Response interfaces, Deploying web Applications,
Session Tracking: Hidden form fields, cookies, URL- Rewriting, session.

Unit-V
JDBC: Introduction, JDBC Drivers, Loading Driver, establishing connection, Executing SQL statement in JSP pages, MVC architecture

Text Books:
2. The Complete Reference PHP- Steven Hozner, TMH.

References:
2. JavaScript, D. Flanagan O’Reilly, SPD.
3. Beginning Web Programming-Jon Dcckett WROX.
OPERATIONS RESEARCH  
(Open Elective-III)

IV-B.Tech-I-Sem

Subject Code: 17ME4105PE

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

1. formulate and solve linear programming problem using various methods  
2. solve transportation and assignment problems  
3. compute sequencing and inventory model problems  
4. analyze waiting lines and replacement problems  
5. evaluate game theory and dynamic programming problems

Unit-I
Linear Programming Problem Formulation - Graphical solution - Simplex method - Artificial variables techniques: Two-phase method, Big M method.

Unit-II

Unit-III
Sequencing: Introduction - Flow - Shop sequencing - n jobs through two machines - n jobs through three machines - Job shop sequencing - two jobs through m machines. 
Inventory: Introduction - Single item, Deterministic models - Purchase inventory models with one price break and multiple price breaks - Stochastic models - demand may be discrete variable or continuous variable - Single Period model and no setup cost.

Unit-IV
Waiting Lines: Introduction - Terminology-Single Channel - Poisson arrivals and Exponential Service times - with infinite population and finite population models- Multichannel - Poisson arrivals and exponential service times with infinite population. 
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-V

Textbooks:
2. Introduction to Operations Research, Hillier & Libermann, TMH.

References:
1. Introduction to Operations Research, Taha, PHl. 

CMR Institute of Technology - UG-Autonomous-Regulations-R-17
POWER PLANT ENGINEERING  
(Professional Elective-II)

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

1. illustrate the concepts of energy sources, steam power plants and combustion process
2. explain the working principles of diesel and gas-turbine power plants
3. establish the hydro electric power plant with various layouts
4. outline the concepts of nuclear power plants
5. determine optimum parameters for power plants

Unit-I  
Introduction to the Sources of Energy: Resources and Development of Power in India.
Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipment, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.
Combustion Process: Properties of coal - overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and drought system, Fluidized Bed Combustion, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection.

Unit-II  
Diesel Power Plant: Introduction - IC Engines, types, construction - Plant layout with auxiliaries - fuel supply system, engine starting equipment, lubrication and cooling system - super charging, Turbocharging.

Unit-III  
Hydro Electric Power Plant: Water power-Hydro logical cycle / flow measurement, Hydro graphs, storage and Poundage, classification of dams and spill ways.
Hydro Projects and Plant: Classification-Typical layouts, plant auxiliaries-plant operation pumped storage plants.

Unit-IV  

Unit-V  
Power Plant Economics and Environmental Considerations: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor -related exercises.

Textbooks:

References:
INDUSTRIAL ENGINEERING  
(Professional Elective-II)

IV-B.Tech-I-Sem  L T P C
Subject Code:  17ME4107PE  3 0 0 3

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

1. explain principles of industrial engineering and management
2. design various organizational structures
3. illustrate principles of operations management and line balancing.
4. analyze the work study and establish limits using SQC
5. assess the methods of job evaluation and project management

Unit-I

Unit-II
Designing Organizational Structures: Departmentization and Decentralization, Types of Organization structures – Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat organization structure and their merits, demerits and suitability.

Unit-III
Operations Management: Objectives- product design process- Process selection-Types of production system(Job, batch and Mass Production), Plant location-factors- Urban-Rural sites comparison- Types of Plant Layouts- Design of product layout.
Line balancing (RPW method) Value analysis-definition-types of values- Objectives- Phases of value analysis- Fast diagram.

Unit-IV

Unit-V

Textbooks:

References:
1. Production & Operation Management, Paneer Selvam, PHI.
UNCONVENTIONAL MACHINING PROCESSES
(Professional Elective-II)

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

1. explain the need, applications of modern machining processes and principles of USM
2. outline working principles of AJM, WJM and AWJM techniques
3. summarize working principles of EDM, EDG and EDW processes
4. illustrate working principles of EBM, LBM and PAM processes
5. adapt working principles of CM and ECM processes

Unit-I
Ultrasound machining: Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

Unit-II
Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations. Magnetic abrasive finishing, Abrasive flow finishing

Unit-III
General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes –Power circuits for EDM, Mechanics of metal removal in EDM.
Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

Unit-IV
Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining –thermal features, cutting speed and accuracy of cut. Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

Unit-V

Textbooks:
1. Advanced machining processes by VK Jain, Allied publishers.

References:
1. Modern Machining Process, Pandey P.C. and Shah H.S., TMH.
CAD/CAM LAB

IV-B.Tech-I-Sem
Subject Code: 17ME4109PC

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Course Outcomes: Upon completion of the course, the student will be able to
1. construct geometric models using CAD packages
2. analyze the stress distribution in structures using FEA packages
3. evaluate thermal gradients using FEA packages
4. develop part programming for various contours
5. adapt CNC technology for manufacturing simple components

List of Experiments (Any 08 of the following):

1. DRAFTING: Development of part drawing for various components in the form of orthographic and isometric views. Representation of dimensions
2. PART MODELING: Generation of various 3D models through protrusion, revolve and sweep. Creation of various features. Study of parent child relation Feature based, Boolean based and assembly modeling. Design of simple components
3. Determination of the deflection and stresses in 2D trusses and 2D beams.
4. Determination of deflections, principal and Von-Mises stresses in plane stress, plane strain.
5. Determination of stresses in 3D shell structures.
6. Harmonic response of 2D beams.
7. Steady State heat transfer analyses of plane.
8. Development of the process sheet for various components based on tooling and machines.
10. Study of various post processor used in NC machines.
11. Development of NC codes for free form and sculptured surfaces using CAM software.
12. Machining of simple components on NC lathe and Mill by transferring NC Code from CAM software
INSTRUMENTATION AND CONTROL SYSTEMS LAB

IV-B.Tech - I- Sem
Subject Code: 17ME4110PC

Pre-requisites: Basic principles of Instrumentation and control systems

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

1. calibrate the measuring devices
2. demonstrate pressure, displacement and vibration measuring devices
3. analyze the temperature measuring devices
4. determine the speed using photo and magnetic speed pickups
5. Perform and calibrate rotameter for flow measurement

List of experiments:

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotameter 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.
FOREIGN LANGUAGE: FRENCH
MANDATORY COURSE (NON-CREDIT)

IV-B.Tech.-I-Sem.
Subject Code: 17HS4112MC

Course Outcomes: Upon completion of the course, the student will be able to
1. identify the basic structure of French language, spelling and pronunciation
2. reproduce the grammatical structure for basic communication
3. recognize and use the grammatical structures for general comprehension
4. use the grammatical and lexical notions in formal and informal situations
5. apply the language skills in communicating effectively at a global platform

Unit-I: Introduction
At the airport: Savoir– faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs _to be_, _to call oneself_, subject pronouns, interrogation.

Unit-II: Grammar
At the University: Savoir-faire: enquiring after one’s welfare, taking leave, expressing appreciation - Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular verbs, to have, to learn, negation, irregular verbs

Unit-III: Conversation
At the café: Savoir –faire: speaking about one’s likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

Unit-IV: Proposal Writing & Formal Letters
At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs
A concert: Savoir –faire: inviting, accepting, expressing one’s inability to accept an invitation

Unit- V: Regular & Irregular Verbs
Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs,
At Nalli’s Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, Exclamative adjectives, imperative tense

Reference:
FOREIGN LANGUAGE: GERMAN  
MANDATORY COURSE (NON-CREDIT)

IV-B.Tech.-I-Sem.  
Subject Code: 17HS4113MC  

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

1. identify the basic structure of German language, spelling and pronunciation
2. reproduce the grammatical structure for self introduction
3. recognize and use the grammatical article structures for basic conversation
4. use the grammatical and verb structure for formal and informal situations
5. apply the language skills in communicating effectively at a global platform

Course structure:
A. German Language (speaking, reading, writing, grammar and test)
B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
C. The German Way (introduction, doing business, conversation, meetings, dining)
D. Germany (Culture, Climate)

Unit-I: Pronounciation
Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers)  
Greetings, ordering, requesting, saying thank you - Grammar – the article “the”, conjugation of verbs

Unit-II: Self Introduction
Shopping - Grammar – adjectives, endings before nouns, practice. Self introduction

Unit-III: Training
Addresses, Occupations, Studies – Grammar - „to be”, the definite/indefinite articles, individual Training

Unit-IV: Oral
Leisure Time, Sports, Hobbies - Grammar – position of a verb in a main clause , oral practice

Unit-V: Narration
At a Restaurant, Food and Drink - Grammar – the personal pronoun in the Nominative and Accusative, Narrating an event

Resources:
1. Sprachkurs Deutsch 1 ( Verlag Diesterweg), New Delhi Learning Centre
IV-B.TECH.-II-SEMESTER SYLLABUS
ROBOTICS

IV-B.Tech-II-Sem

Subject Code: 17ME4201PC

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

1. select suitable end effectors for industrial automation
2. perform kinematic analysis on end-effector positioning
3. estimate forces using dynamic formulation
4. plan path of the end effector using feedback components
5. apply the robot technologies in various industrial applications

Unit – I:

Unit – II:
Motion Analysis: Basic Rotation Matrices, Equivalent Axis and Angle, Euler Angles, Composite Rotation Matrices. Homogeneous transformations as applicable to rotation and translation – problems

Unit – III:
Differential Kinematics: Differential kinematics of planar and spherical manipulators, Jacobians – problems,

Unit IV:
Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint interpolated motion – straight line motion. Cubic polynomial fit.

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 /Mc Graw Hill
2. Robotics / Fu K S / McGraw Hill

Reference Books:
1. Robot Dynamics and Controls / Spony and Vidyasagar / John Wiley
2. Robot Analysis and control / Asada , Slotine / Wiley Inter-Science
3. Robotics and Control / Mittal R K & Nagrauth / TMH
RENEWABLE ENERGY SYSTEMS
(Professional Elective-III)

IV-B.Tech-II-Sem

Subject Code: 17ME4202PE

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

1. analyze global and national energy scenarios
2. illustrate the various solar energy systems
3. demonstrate the aspects related to wind energy power plants
4. build the power plants using bio gas
5. estimate the power generation in hydroelectric plants

Unit I
Introduction-Principles of solar radiation: Energy Sources, Classification of Energy Sources (Renewable and Non Renewable) Energy need and energy consumption of India, Role and potential of the renewable source, the solar energy option, Environmental impact of solar power-Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

Unit II
Solar energy collection-Solar energy storage and Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advances collectors, Different methods, sensible, latent heat and stratified storage, solar ponds, Solar application, solar heating/cooling techniques, solar distillation and drying, Photovoltaic energy conversion

Unit III

Unit IV
Geothermal energy: Resources, types of wells, methods of harnessing the energy, potential in India O T E C: Principles, utilization, setting of OTEC plants, thermodynamics cycles, Tidal: Potential and conversion techniques, Wave energy

Unit V
Direct energy conversion: Need for DEC, principles of DEC. Thermo electric generators, seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects.principle. Faraday’s laws, thermodynamics aspects Selection of fuels and operating conditions

Textbook (s)
1. G.D. Rai, Non- conventional Energy Sources, Khanna Publications, 2005
3. Km Mittal , Non-conventional energy Systems, Wheeler publishing co. limited, 2003

Reference (s)
MACHINE TOOL DESIGN
(Professional Elective-III)

IV-B.Tech-II-Sem
Subject Code: 17ME4203PE

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Pre requisites
Design of machine members I and II, Machine Tools and Metrology,

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

1. synthesize of machine tool mechanisms
2. select speed ranges in machine drives
3. design feed gear boxes
4. summarize about spindles of various machine tools
5. classify various controls used in machine tools

Unit-I
Introduction: Classification of machine tools Mechanisms used for converting rotary to linear motion and intermittent motion - Kinematic structures of machine tools - general purpose, special purpose, automatic screw cutting machines - Basic features of transfer machines - Numerical Control of machine tools, advantages and limitations Schematic diagrams of NC systems.

Unit-II
Drives of machine tools; selection of range of speeds and feeds Speed layout in GP, AP and logarithmic progression - Standardization of speeds and feeds - Productivity loss Selection of highest and lowest speeds, range ratio - Design of ray diagram and structural diagrams for machine tool gear boxes - Determination of number of teeth and module of gears in gear box design - Rules for layout of gear box having sliding clusters. Sliding cluster and clutched drives, Ruppert drive.

Unit-III

Unit-IV
Spindle units: Spindles of lathe, Drilling, Milling and grinding machines materials for spindles - Spindle design. Effect of clearance on the rigidity of spindle Hydro-dynamic and Hydro-static bearings; Requirements of spindle bearings

Unit-V

Text Books:

References
1. S.K.Basu, Design of machine tools, Allied Publishers
Course Outcomes: Upon completion of the course, the student will be able to

1. summarize characteristics and applications of ANN
2. illustrate perceptron models, networks and training algorithms
3. make use of various associative memories
4. analyze hopfield networks
5. explain various concepts of fuzzy logics

Unit-I

Unit-II

Unit-III
Associative Memories-I: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

Unit-IV

Unit – V
Fuzzy Logic: Classical & Fuzzy Sets: Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, De—fuzzification methods.

Text Books
1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, Rajasekharan and Pal, PHI.
2. Neural Networks and Fuzzy Logic, C. Naga Bhaskar, G. Vijay Kumar, BS Publications.

Reference Books
1. Artificial Neural Networks, B. Yegnanarayana, PHI.
2. Artificial Neural Networks, Zaruda, PHI.
PRODUCTION PLANNING AND CONTROL
(Professional Elective-III)

IV-B.Tech-II-Sem
Subject Code: 17ME4205PE

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

1. illustrate the functions of PPC
2. outline the principles and types of forecasting
3. differentiate various inventory control techniques
4. solve routing and scheduling problems
5. summarize dispatching process

Unit-I

Introduction: Definitions: PPC - Objectives and applications of production planning and control, Functions of production planning and control, elements of production planning and control- Types of productions: job, batch and mass production- Organizations of production planning and control — internal organizations and departments- Marketing aspect.

Unit-II

Forecasting: Introduction, Importance and General Principles of forecasting -Types of forecasting techniques: Qualitative methods, quantitative methods, Long term and Short term sales forecasting methods Applications of forecasting.

Unit-III

Inventory management: Introduction- Functions of inventory control-ABC analysis- VED Analysis- EOQ technique.

Models of Inventory control systems: P-Systems and Q-Systems -Introduction to MRP And ERP, LOB( Line of balance ), JIT inventory, Japanese concepts.

Unit-IV


Unit-V

Dispatching: Dispatching procedure, follow up - definition - functions - types of follow up and their functions, applications of computer in production planning and control.

Textbooks:

1. Production Planning and Control! M.Mahajan, Dhanpatirai & Co.
2. Production Planning and Control, Jam & Jam, Khanna publications.

References:

1. Production Planning and Control, Text & cases, SK Mukhopadhyyaya, PHI.
2. Production and operations Management U R.Panneer Selvam, PHI.
3. Production and Operations Management (Theory and Practice), Dipak.
FLUID POWER SYSTEMS
(Professional Elective-IV)

IV-B.Tech-II-Sem

Subject Code: 17ME4206PE

Pre requisites: Fluid mechanics and Hydraulic machinery

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

1. classify components of hydraulic systems
2. compare components of pneumatic systems
3. design fluid power circuits for industrial applications
4. build electro fluid power circuits
5. develop fluid power circuits for industrial automation

Unit 1

Unit 2
Pneumatic Components: Introduction to Pneumatics-Compressors-types-Air treatment-FRL unit-Air dryer-Control valves-Logic valves-Time delay valve and quick exhaust valve-Pneumatic Sensors-types-characteristics and applications

Unit 3

Unit 4
Electro - Pneumatics and Hydraulics: Relay, Switches-Solenoid-Solenoid operated valves-Timer-Counter-Servo and proportional control-Microcontroller and PLC based control-Design of electro-pneumatic and hydraulic circuits.

Unit 5

Text Books

References
COMPUTATIONAL FLUID DYNAMICS  
(Professional Elective-IV)

IV-B.Tech-II-Sem  
Subject Code: 17ME4207PE  

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

1. distinguish various numerical methods used in CFD
2. explain the basic rules of FVM
3. apply FVM to solve convection and diffusion problems
4. solve flow field problems using CFD
5. analyze turbulent flows by applying CFD concepts

Unit-I


Unit-II


Unit-III

FVM to Convection and Diffusion: Concept of Elliptic, Parabolic and Hyperbolic Equations applied to fluid flow – Governing Equations of Flow and Heat transfer.


Unit-IV


Unit-V

Turbulent Flows: Direct Numerical Simulation, Large Eddy Simulation and RANS Models


Textbooks:


References:

2. Computational Fluid Dynamics – Anderson (TMH).
FLEXIBLE MANUFACTURING SYSTEMS
(Professional Elective-IV)

Subject Code: 17ME4208PE

Pre requisites: Production Technology and CAD/CAM

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

1. explain the concepts of FMS
2. make use of automated material handling systems
3. perform engineering analysis of ASRS
4. identify bottlenecks in FMS operational issues
5. summarize the concepts of JIT and lean manufacturing

Unit-I


Unit-II


Unit-III


Unit-IV


Unit-V


Textbooks:
1. Automation, Production Systems, and Computer Integrated Manufacturing, Mikell P. Groover, PHI.

References:
ADVANCED MECHANICS OF SOLIDS  
(Professional Elective-IV)  

IV-B.Tech-II-Sem  

Subject Code: 17ME4209PE  

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**Course Outcomes:** At the end of the course students will be able to

1. apply concepts of stress and strain analyses in solids  
2. solve the constitutive equations of bending of cantilever beams  
3. assess stress concentration using stress functions  
4. solve unsymmetric bending problems  
5. determine deflections and deformations using energy methods

**UNIT I**  
Introduction to stress analysis in elastic solids - stress at a point – stress tensor – stress components in rectangular and polar coordinate systems - Cauchy’s equations – stress transformation – principal stresses and planes - hydrostatic and deviatoric stress components, octahedral shear stress - equations of equilibrium. Displacement field – engineering strain - strain tensor (basics only) – analogy between stress and strain tensors - strain-displacement relations (small-strain only) – compatibility conditions

**UNIT II**  

**UNIT III**  
Equations in polar coordinates (2D) – equilibrium equations, strain displacement relations, Airy’s equation, stress function and stress components (only short derivations for examination)  
Application of stress function to Lame’s problem and stress concentration problem of a small hole in a large plate (only stress distribution)  
Axisymmetric problems – governing equations – application to thick cylinders,, rotating discs.

**UNIT IV**  
Unsymmetrical bending of straight beams (problems having c/s with one axis of symmetry only) – curved beams (rectangular c/s only) – shear center of thin walled open sections (c/s with one axis of symmetry only). Strain energy of deformation – special cases of a body subjected to 15% concentrated loads, moment or torque - reciprocal relation – strain energy of a bar subjected to axial force, shear force, bending moment and torque

**UNIT V**  
Maxwell reciprocal theorem – Castiglione’s first and second theorems – virtual work principle – minimum potential energy theorem. Torsion of non-circular bars: Saint Venant’s theory - solutions for circular and elliptical cross-sections

**Text Books:**  

**References Books:**  