AR22
ACADEMIC REGULATIONS

COMPUTER SCIENCE AND ENGINEERING

For CBCS BASED B.TECH – FOUR YEAR PROGRAM
(Applicable for the batches admitted from AY 2022-23)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana State, Pin Code: 501 301
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ACADEMIC REGULATIONS 2022

For CBCS Based B.Tech PROGRAMMES
(Effective for the students admitted into FIRST year from the Academic Year 2022-2023)

1. Under-Graduate Degree Programme (B.Tech) in Engineering
Geethanjali College of Engineering and Technology (GCET) offers four (4) Year (eight (8) Semesters) Bachelor of Technology (B.Tech) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2022-2023, in the following Branches of Engineering

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<td>Electronics and Communication Engineering</td>
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<td>9.</td>
<td>Mechanical Engineering</td>
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2. Eligibility for Admission
2.1 Admission to the B.Tech Programme shall be made either on the basis of the merit rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (EAMCET), or on the basis of any other order of merit approved by the Government of Telangana, subject to reservations as prescribed from time to time.
2.2 The medium of instruction for all the B.Tech programmes shall be ENGLISH only.

3. B.Tech Programme Structure
3.1 A student after securing admission shall complete the B. Tech programme in a minimum period of four (4) academic years (eight (8) semesters), and a maximum period of eight (8) academic years (sixteen (16) semesters) starting from the date of commencement of first year first semester, failing which the student shall forfeit his seat in B. Tech program. The student shall secure 160 credits (with CGPA ≥ 5) required for the completion of the undergraduate programme and award of the B. Tech degree.
3.2 UGC / AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are as listed below.
3.2.1 Semester Scheme:
Each B. Tech program is of four (4) academic years (eight (8) semesters), with each academic year being divided into two semesters of 20 weeks (minimum of 90 working days) each. Each semester has - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’. Choice Based Credit System (CBCS) as indicated by UGC and curriculum / programme structure as suggested by AICTE are followed.

3.2.2 Credit Courses:
All courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each course in a L: T: P/D: C (Lecture periods: Tutorial periods: Practicals / Drawing periods: Credits) Structure, based on the following general pattern...
- One credit - for one hour / week / semester for Theory / Lecture (L) / Tutorial(T) courses;
- One-half (½) of a credit – for one hour / week / semester for Laboratory / Practical (P) or Drawing (D) courses.
- No Credits for mandatory courses.

3.2.3 Course Classification:
The College follows almost all the guidelines issued by AICTE/ UGC. All subjects/ courses offered for the B.Tech. Degree programmes are broadly classified as follows.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Broad Course Classification</th>
<th>Course Group/Category</th>
<th>Course Description</th>
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<tr>
<td>1</td>
<td>Foundation Courses (FnC)</td>
<td>BSC-Basic Science Courses</td>
<td>Includes Mathematics, Physics and Chemistry courses</td>
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<tr>
<td>2</td>
<td>ESC-Engineering Science Courses</td>
<td>Includes Fundamental Engineering Courses</td>
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<tr>
<td>3</td>
<td>HSMC-Humanities and Social sciences including Management Courses</td>
<td>Includes courses related to Humanities, Social Sciences and Management</td>
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<tr>
<td>4</td>
<td>Core Courses (CoC)</td>
<td>PCC-Professional Core Courses</td>
<td>Includes core courses related to parent discipline/department/ branch of Engineering</td>
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<tr>
<td>5</td>
<td>Elective Courses (EℓC)</td>
<td>PEC-Professional Elective Courses</td>
<td>Includes elective courses related to parent discipline / related department / branch of Engineering</td>
</tr>
<tr>
<td>6</td>
<td>OEC-Open Elective Courses</td>
<td>Elective Courses which include interdisciplinary courses or courses in an area outside the parent discipline/department/branch of engineering</td>
<td></td>
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<tr>
<td>7</td>
<td>Core Courses</td>
<td>PROJ –Project</td>
<td>Project Seminar/ Project</td>
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<tr>
<td>8</td>
<td></td>
<td>Design Thinking/ Internship/ Industry Oriented Mini-Project/ Mini-Project</td>
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<td>9</td>
<td></td>
<td>Technical Seminar based on core contents related to parent discipline/ department/ branch of Engineering.</td>
<td></td>
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<tr>
<td>10</td>
<td>Mandatory Courses (MC)</td>
<td>Mandatory courses (Non Credit)</td>
<td></td>
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4. Course Registration

4.1 A ‘Faculty Advisor or Counselor’ shall be assigned to a group of around 20 students, who shall advise the students about the B.Tech programme, its structure along with curriculum, choice / option for course(s), based on their competence, progress, pre-requisites and interest.

4.2 The Academic Departments of the college invite ‘Registration Forms’ from students before the beginning of the semester. Registration requests for any ‘CURRENT SEMESTER’ shall be completed BEFORE the commencement of SEE(s) (Semester End Examinations) of the ‘PRECEDING SEMESTER’.

4.3 A student may be permitted to register for all the courses in a semester as specified in the course structure with maximum additional course(s) (elective course(s)) limited to 6 credits, duly approved by faculty advisor, based on progress and SGPA/CGPA, and completion of the ‘pre-requisites’ as indicated for various courses, in the department course structure and syllabus content.

4.4 A student can apply for registration, ONLY AFTER obtaining the ‘WRITTEN APPROVAL’ from his faculty advisor, which should be submitted to the College Academic Committee through Head of the Department concerned (a copy of the same being retained with Head of the Department, Faculty Advisor and the student).

4.5 If the student submits ambiguous choices or multiple options or erroneous entries - during registration for the course(s) under a given / specified course(s) Group/ Category, as listed in the programme structure, Faculty Advisor shall rectify such errors and advise the student accordingly.

4.6 Course(s) options exercised by the student and approved by Faculty Advisor are final and CANNOT be changed, or inter-changed. Further, alternate choices shall also not be considered. However, if the course(s) that has (have) already been listed for registration (by 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 new course(s) (subject to offering of such course(s)), or for another existing course(s) offered, which may be considered. Such alternate arrangements shall be made by the department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of class-work for that semester.

4.7 Dropping of course(s) may be permitted, only after obtaining prior approval from the faculty advisor / counselor ‘within a period of 15 days’ from the beginning of the current semester.

4.8 Open electives: The student has to choose open electives from the list of open electives given. However, the student cannot opt for an open elective course(s) offered by his own (parent) department.

4.9 Professional electives: The student has to choose the required professional electives from the list given.
5. **Courses to be offered**

5.1.1 A Course may be offered to the students, ONLY IF a Minimum of 15 students.

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

5.1.3 If more entries for registration of a course come into picture then the Head of the Department concerned shall decide whether or not to offer such a course for two or more sections.

5.1.4 In case of options coming from students of other departments / branches / disciplines (not considering OPEN ELECTIVES), PRIORITY shall be given to the student of the ‘Parent Department’.

6 **Attendance Requirements**

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% attendance in aggregate of all the courses (including attendance in mandatory course like Environmental Science, Indian Constitution for that semester).

6.2 Shortage of attendance in aggregate upto 10% (65% and above, and below 75%) in each semester may be condoned 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 Semester End Examinations. They get detained and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester.**

They may seek re-registration for all those course(s) registered in the semester in which they were detained, by seeking re-admission into that semester as and when offered. In the case of elective course(s), namely, professional elective(s) and / or open elective(s), the same may also be re-registered, if offered. However, if those elective(s) are not offered in later semesters, then alternate elective(s) may be chosen from the SAME set of elective course(s) offered under that specific category.

6.6 A student fulfilling the attendance requirements 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 requirement mentioned in section 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% (14 marks out of 40 marks including minimum 35% of average Mid-Term examinations for 25 marks) in the internal examinations, not less than 35% (21 marks out of 60 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing ‘C’ grade or above in that subject/ course.
7.2 Academic requirements in respect of Internship, Mini-Project, Technical Seminar, Project Seminar, Project, Activity Oriented (Non-Laboratory) courses such as Design Thinking, Logical reasoning and English Language courses (English for effective communication, English for career development, English for professional success) are as follows:

<table>
<thead>
<tr>
<th>Name of the Course</th>
<th>Academic Requirements</th>
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| Internship                    | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Internship if the student: i. Submits a report on his Internship.  
                                      ii. Makes a presentation of the Internship carried out before the Departmental Evaluation Committee as per schedule  
                                      iii. Secures not less than 40% of the total marks allocated for the course in the evaluation by Departmental Evaluation Committee. |
| Mini-Project                  | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini-Project if the student: i. Submits a report on his Mini-Project.  
                                      ii. Makes a presentation of the Mini-Project carried out before the Departmental Evaluation Committee as per schedule.  
                                      iii. Secures not less than 40% of the total marks allocated for the course in the evaluation by Departmental Evaluation Committee. |
| Project Seminar               | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Project Seminar if the student: i. Submits a report on his Project Seminar.  
                                      ii. Makes a presentation of the Project Seminar carried out before the Departmental Evaluation Committee as per schedule.  
                                      iii. Secures not less than 40% of the total marks allocated for the course in the evaluation by Departmental Evaluation Committee. |
| Technical Seminar             | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Technical Seminar if the student: i. Submits a report on his Technical Seminar.  
                                      ii. Makes a presentation of the Technical Seminar carried out before the Departmental Evaluation Committee as per schedule.  
                                      iii. Secures not less than 40% of the total marks allocated for the course in the evaluation by Departmental Evaluation Committee. |
| *Project                      | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Project if the student: i. Submits a report on his Project.  
                                      ii. Makes a presentation of the Project carried out before the Internal Project Review Committee as per schedule.  
                                      iii. Secures not less than 40% of the total marks allocated for the course, in the project evaluation. |
| Activity Oriented (Non-Laboratory) courses (CIE) | A student shall be deemed to have satisfied the academic requirements and earned the credits allotted if the student: i. Submits all assignments in time.  
                                      ii. Secures not less than 40% of the total marks allocated for the course in continuous Internal Evaluation. |
*Note: A student who has not satisfied the above requirements in any of the courses mentioned in the above table, is deemed to have failed; he may reappear once for each of the evaluations in the failed courses when they are scheduled again. If he fails in such “one reappearance” evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

### 7.3 Promotion Rules

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<td>First year First semester to First year Second semester</td>
<td>Regular course of study of First year First semester.</td>
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</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 50% of the credits specified in the program structure of first year (up to and including 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 60% of the credits specified in the program structure of second year (up to and including second year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 5      | Third year first semester to Third year second semester | Regular course of study of Third year First semester. |
| 6      | Third year second semester to Fourth year first semester | i. Regular course of study of Third Year Second semester.  
 ii. Must have secured at least 60% of the credits specified in the program structure of third year (up to and including third year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 7      | Fourth year First semester to Fourth year Second semester | Regular course of study of Fourth year First semester. |

7.4 A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the program structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA ≥ 5 (at the end of 8 semesters), (iv) passes all the mandatory courses, to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be
considered for the calculation of the final CGPA (at the end of undergraduate programme), and shall be indicated in the grade card / marks memo of IV-year II semester.

7.5 If a student registers for ‘extra Courses’ (in the parent department or other departments/branches of Engg.) other than those listed Courses totaling to 160 credits as specified in the course structure of his department, the performances in those ‘extra Courses’ (although evaluated and graded using the same procedure as that of the required 160 credits) will not be considered while calculating the SGPA and CGPA. For such ‘extra Courses’ registered, percentage of marks and letter grade alone will be indicated in the grade card / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items 6 and 7.1 – 7.4 above.

7.6 A student eligible to appear in the semester end examination for any 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 course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that Course.

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

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

8 Evaluation - Distribution and Weightage of Marks

8.1 The performance of a student in each semester shall be evaluated course-wise (irrespective of credits assigned) with a maximum of 100 marks for all types of course(s), namely, theory, drawing, practicals, Internship, Mini-Project, Project Seminar, Project, Technical seminar, Activity Oriented (Non-Laboratory) courses etc., and their evaluation is as follows:

Theory, practical, drawing and Project course(s) shall be evaluated based on 40% CIE (Continuous Internal Evaluation) and 60% SEE (Semester End Examination).

Internship/ Mini-project/ Project Seminar / Technical seminar/ Activity Oriented (Non-Laboratory) courses shall be evaluated internally by the Department Evaluation Committee.

Note: A letter grade corresponding to the % marks obtained shall be given for all course(s) as mentioned in section 9.2.

In CIE, for theory Courses, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) Part – A for 10 marks, ii) Part – B for 15 marks with a total duration of 2 hours as follows:

1. Mid-Term Examination for 25 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part – B : Descriptive paper for 15 marks.

Student shall have to earn 35%, i.e. 9 marks out of 25 marks from average of two mid-term examinations (I Mid-Term & II Mid-Term).
The remaining 15 marks of Continuous Internal Assessment (out of 40) are distributed as:

2. Assignment for 5 marks. (Average of 2 Assignments each for 5 marks)
3. Course Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned Course for 10 marks.

- The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 5 full questions out of which, the student has to answer 3 questions, each carrying 5 marks. The student has to get minimum of 35% (on 25 marks allocated for Mid-Term examinations) on average of two Mid-Term examinations.

While the first mid-term examination shall be conducted on first 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the Course teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Course Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the Course concerned for 10 marks before II Mid-Term Examination.

The details of the question paper pattern for Semester End Examination (SEE) shall be as follows:

The semester end examinations (SEE), for theory courses, will be conducted for 60 marks consisting of two parts viz. i) Part- A for 10 marks, ii) Part - B for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- The duration of Semester End Examination is 3 hours.

8.2 For laboratory course(s), there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks, and Semester End Examination (SEE) for 60 marks.

A detailed break up of 40 marks for CIE is given below:
1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
2. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall
be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the other reputed colleges which will be decided/approved by the examination branch/Chief Controller of Examinations of the Institution.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course and
5. 10 marks for viva-voce on concerned laboratory course

8.3 Internship, Mini-Project, Technical Seminar, Project seminar, Project and Activity Oriented courses.

8.3.1 There shall be an internship, which the student shall carryout immediately after Second year second semester examinations and pursue it during summer vacation for a duration of about four weeks. The Work carried out during Internship shall be submitted in the form of a report, and a presentation of the same shall be made before a committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department or his nominee, the supervisor allocated for the internship, one senior faculty of the department. There shall be only CIE for 100 marks for internship and shall be evaluated during third year first semester.

8.3.2 There shall be a Mini Project, which the student shall carryout immediately after Third year second semester examinations and pursue it during summer vacation. Mini Project shall be submitted in the form of a report, duly approved by the departmental internal evaluation committee, and presented before the examination committee in Fourth year first semester. It shall be evaluated for 100 marks as SEE. The examination committee consists of Head of the Department or his nominee, supervisor of the mini project, a senior faculty member of the department. There shall be no internal marks (CIE) for Mini Project.

8.3.3 There shall be a technical seminar presentation in Fourth year second semester, for which, the student shall collect the information on a specialized topic, prepare a technical report, submit it and present the same before a departmental committee. It shall be evaluated by the departmental committee, consisting of Head of the Department or his nominee, seminar supervisor and a senior faculty member. The technical seminar report shall be evaluated for 100 marks as CIE.

8.3.4 There shall be a Project seminar presentation in Fourth year First semester, for which, the student shall collect the information on the Project topic, prepare a report, submit it and present the same before a departmental committee. It shall be evaluated internally (CIE) for
100 marks by the departmental committee, consisting of Head of the Department or his nominee, seminar supervisor and a senior faculty member.

8.3.5 The student shall carry out the Project in final year second semester. There shall be three reviews, one at the end of the fourth week, another at the end of the ninth week and third at the end of the fourteenth week. The reviews shall be conducted and evaluated by an internal project review committee. The committee shall consist of Head of the Department or his nominee, the supervisor allocated for the Project, and two Professors / Assoc-Professors of the department. Each review shall be evaluated for forty (40) marks and average of all three reviews shall constitute CIE of forty (40) marks. Project carried out shall be submitted in a dissertation form, and a presentation of the same shall be made before a final examination committee consisting of Head of the Department or his nominee, the supervisor and an external examiner, appointed by the chief controller of examinations, selected from a panel of examiners suggested by the chairperson, BoS, which evaluates it for sixty (60) marks.

8.3.6 Activity Oriented (Non-laboratory) courses shall be evaluated internally (CIE) for 100 marks; there shall be no SEE.

8.3.7 For mandatory / non-credit course(s), a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for securing satisfactory grade.

8.3.8 No marks / letter grades shall be allotted for mandatory/non-credit course(s). Only Satisfactory (S) / Unsatisfactory (US) shall be indicated in Grade Card.

8.4 A student shall be given one-time chance to re-register for a maximum of two Courses:
- If the internal marks secured by a candidate in Mid examinations (average of two mid-term examinations consisting of Objective & descriptive parts) are less than 35% and failed in those Courses (Or)
- Failed in Assignment & Course Viva-voce/ PPT/Poster Presentation/ Case Study on a topic in the concerned Course but fulfilled the attendance requirement.

A student must re-register for the failed course(s) for 40 marks within four weeks of commencement of the classwork in next academic year. Also, the student has to earn 35% of total internal marks (14 out of 40 marks including Mid-Term examinations, Assignment & Course Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned course).

In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

9 Grading procedure

9.1 Grades shall be awarded to indicate the performance of students in each theory course, laboratory / practicals / Engineering Graphics / Drawing, Technical Seminar, Internship, Mini-Project, Project, Activity Oriented courses based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in section 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:
% of Marks Secured in a Course (Class Intervals) | Letter Grade (UGC Guidelines) | Grade Points
---|---|---
Greater than or equal to 90% | O (Outstanding) | 10
80 and less than 90% | A* (Excellent) | 9
70 and less than 80% | A (Very Good) | 8
60 and less than 70% | B* (Good) | 7
50 and less than 60% | B (Average) | 6
40 and less than 50% | C (Pass) | 5
Below 40% | F (FAIL) | 0
Absent | Ab | 0

9.3 A student who has obtained an ‘F’ grade in any course(s) shall be deemed to have ‘failed’ and is required to reappear as a ‘supplementary candidate’ in the semester end examination, as and when conducted. However, the internal marks in those course(s) shall remain the same as obtained earlier.

9.4 A student, who has not appeared for an examination in any course(s), shall be awarded ‘Ab’ grade in that course(s), and shall be deemed to have ‘failed’ in that course(s). Such a student shall be required to reappear as a ‘supplementary candidate’ in the semester end examination, as and when conducted. However, the internal marks in those course(s) shall remain the same as obtained earlier.

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns a grade point (GP) in each course, on the basis of the letter grade secured in that course. The corresponding ‘Credit Points (CP)’ for a course are computed by multiplying the grade point with credits for that particular course.

\[
\text{Credit points (CP) = grade point (GP) x credits} \quad \text{For a course}
\]

9.7 A student passes a course, only when the student secures a \( GP \geq 5 \) (‘C’ grade or above) in that course.

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) secured from all course(s) registered for in a semester, by the total number of credits registered for in that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

\[
\text{SGPA} = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{i=1}^{N} C_i} \quad \text{For each Semester,}
\]

where ‘i’ is the course indicator index (takes into account all course(s) in a semester), ‘N’ is the number of courses ‘registered’ for in that semester (as specifically required and listed under the program structure of the parent department), \( C_i \) is the number of credits allotted to the \( i^{th} \) course, and \( G_i \) represents the grade points (GP) corresponding to the letter grade awarded for that \( i^{th} \) course.
9.9 The Cumulative Grade Point Average (CGPA) is a measure of the cumulative performance of a student in all the courses registered from all the semesters. The CGPA is the ratio of the total credit points secured by a student in all the registered courses in all the semesters, and the total number of credits registered for in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the First year second semester onwards at the end of each semester as per the formula

\[
CGPA = \frac{\sum_{j=1}^{M} C_j G_j}{\sum_{j=1}^{M} C_j} \quad \text{for all S Semesters registered,}
\]

\[
\text{ie., upto and inclusive of S Semesters, } S \geq 2,
\]

where ‘M’ is the total number of courses (as specifically required and listed under the program structure of the parent department) the student has ‘registered’ for i.e. from the first semester onwards up to and inclusive of the eighth semester, ‘j’ is the course indicator index (takes into account, all course(s) from first semester to eighth semester), C is the number of credits allotted to the j\textsuperscript{th} course, and \(G_j\) represents the grade points (GP) corresponding to the letter grade awarded for that j\textsuperscript{th} course. After registration and completion of First year first semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.
Illustration of calculation of SGPA:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Letter Grade</th>
<th>Grade Point</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 x 8=32</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4 x 10=40</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>C</td>
<td>5</td>
<td>4 x 5=20</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 x 6=18</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>A+</td>
<td>9</td>
<td>3 x 9=27</td>
</tr>
<tr>
<td>Course 6</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 x 5=15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>Total Credit Points</strong></td>
<td><strong>152</strong></td>
<td></td>
</tr>
</tbody>
</table>

SGPA = 152/21 = 7.24
Illustration of calculation of CGPA up to 3rd semester:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Credits Allotted</th>
<th>Letter Grade</th>
<th>Corresponding Grade Point</th>
<th>Credit Points (CP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Course 1</td>
<td>3</td>
<td>A</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>I</td>
<td>Course 2</td>
<td>3</td>
<td>O</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>I</td>
<td>Course 3</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>I</td>
<td>Course 4</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>I</td>
<td>Course 5</td>
<td>3</td>
<td>A+</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>I</td>
<td>Course 6</td>
<td>4</td>
<td>C</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>II</td>
<td>Course 7</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>II</td>
<td>Course 8</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>II</td>
<td>Course 9</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td>Course 10</td>
<td>3</td>
<td>O</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>II</td>
<td>Course 11</td>
<td>3</td>
<td>B+</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>II</td>
<td>Course 12</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>II</td>
<td>Course 13</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>II</td>
<td>Course 14</td>
<td>3</td>
<td>O</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>III</td>
<td>Course 15</td>
<td>2</td>
<td>A</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>III</td>
<td>Course 16</td>
<td>1</td>
<td>C</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>III</td>
<td>Course 17</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>III</td>
<td>Course 18</td>
<td>3</td>
<td>B+</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>III</td>
<td>Course 19</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>III</td>
<td>Course 20</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>III</td>
<td>Course 21</td>
<td>3</td>
<td>B+</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td>69</td>
<td></td>
<td></td>
<td>518</td>
</tr>
</tbody>
</table>

CGPA = 518/69 = 7.51

The above illustrated calculation process of CGPA shall be followed for each subsequent semester until eighth semester. The CGPA obtained at the end of eighth semester will become the final CGPA secured for entire B. Tech Programme.

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

9.11 SGPA and CGPA of a semester shall be mentioned in the semester Memorandum of Grades if all courses of that semester are passed in the first attempt. Otherwise, the SGPA and CGPA shall be mentioned only on the Memorandum of Grades generated after the student has passed his last examination in that semester. However, mandatory course(s) will not be taken into consideration.

10. Passing Standards:

10.1 A student shall be declared ‘SUCCESSFUL’ or ‘PASSED’ in a semester, only when he gets an SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared ‘SUCCESSFUL’ or ‘PASSED’ in the entire B.Tech programme, only when
he gets a CGPA $\geq 5.00$, subject to the condition that he secures a GP $\geq 5$ (C Grade or above) in every registered course(s) in each semester (during the entire B.Tech Programme) for award of the degree.

10.2 After the completion of each semester, a Grade Card or Grade Sheet (Memorandum of Grades) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It shall show the details of the course(s) registered (course(s) code, title, number of credits, grade earned etc.), credits earned, SGPA and CGPA.

10.3 **There shall be no exemption of credits under any circumstances.**

11. **Declaration of Results**

11.1 Computation of SGPA and CGPA are done using the procedure listed in sections 9.5 through 9.8.

11.2 For final % of marks equivalent to the computed final CGPA, the following formula shall be used:

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

12. **Award of Degree**

12.1 A student who registers for all the specified course(s) as listed in the programme structure, satisfies all the programme requirements, and passes all the examinations prescribed in the entire B.Tech programme, and secures the required number of 160 credits (with CGPA $\geq 5.0$), within eight (8) academic years from the date of commencement of the first academic year, shall be declared to have **QUALIFIED** for the award of the B.Tech degree in the branch of Engineering studied.

12.2 A student who qualifies for the award of the degree as listed in section 12.1, shall be placed in the following classes based on evaluation as per section 7.4:

12.2.1 Students with final CGPA (at the end of the B. Tech Programme) $\geq 8.00$ and fulfilling the following conditions shall be placed in ‘FIRST CLASS with DISTINCTION’ -

i. should have passed all the courses in ‘FIRST APPEARANCE’ within the first four (4) academic years (or eight (8) sequential semesters) from the date of commencement of his first academic year,

ii. should not have been detained or prevented from writing the Semester End Examinations in any semester due to shortage of attendance or any other reason.

12.2.2 Students having final CGPA (at the end of B.Tech Programme) $\geq 8.00$, but not fulfilling the above conditions shall be placed in ‘FIRST CLASS’.

12.2.3 Students with final CGPA (at the end of the B.TECH Programme) $\geq 7.00$ but $< 8.00$, shall be placed in ‘FIRST CLASS’.

12.2.4 Students with final CGPA (at the end of the B.TECH Programme) $\geq 6.00$ but $< 7.00$, shall be placed in ‘SECOND CLASS’.

12.2.5 All other Students who qualify for the award of the degree (as per Section 12.1), with final CGPA (at the end of the B.Tech Programme) $\geq 5.00$ but $< 6.00$, shall be placed in ‘PASS CLASS’.

12.3 A student with final CGPA (at the end of the B. Tech Programme) $< 5.00$ shall not be eligible for the award of the degree.
12.4 Students fulfilling the conditions listed under section (iii) of 12.2.1 alone shall be eligible for the award of ‘college rank’ and / or ‘gold / silver / bronze medal’.

12.5 Award of 2-Year B.Tech. Diploma Certificate

12.5.1 A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (with in 4 years from the date of admission) up to B. Tech. – II Year – II Semester, if the student want to exit the 4-Year B. Tech. program. The student once opted and awarded for 2-Year UG Diploma Certificate, the student will not be permitted to join in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.

12.5.2 A student may be permitted to take one year break after completion of II Year – II Semester or B. Tech. – III Year – II Semester (with permission through the principal of the college well in advance) and can re-enter the course in next Academic Year in the same college and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

13. Withholding of Results

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

14. Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of AR18/AR20 Regulations due to lack of attendance, shall be permitted to join I year I Semester of AR22 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 AR18/AR20 regulations for want of attendance, shall be permitted to join the corresponding semester of AR22 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 AR22 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 AR18/AR20 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of AR22 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including AR18, AR20 and AR22
regulations. 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 AR22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in AR22 Regulations:

4. A student who has failed in any Course under any regulation has to pass those Courses 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 AR22 Regulations. There is NO exemption of credits in any case.

6. If a student is readmitted to AR22 Regulations and has any Course with 80% of syllabus common with his/her previous regulations, that particular Course in AR22 Regulations will be substituted by another Course to be suggested by the College.

Note: If a student readmitted to AR22 Regulations and has not studied any Courses/topics in his/her earlier regulations of study which is prerequisite for further Courses in AR22 Regulations, the College shall conduct remedial classes to cover those Courses/topics for the benefit of the students.

15. Student Transfers

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

15.2 The students seeking transfer to this college from other Universities/institutions should obtain NoC from the college and apply to Department of Technical Education, Government of Telangana, and Telangana state. The student, on transfer, shall pass additional courses, from the courses, from the courses prescribed in the curriculum of AR22, upto the class/semester preceding the class/semester into which the student is admitted, if he had not studied those courses or their equivalents, or failed in those courses at the previous institution.

15.3 Further, though the students have passed some of the Courses at the earlier institutions, if the same Courses are prescribed in different semesters of GCET, the students have to study those Courses in GCET in spite of the fact that those Courses are repeated.

15.4 The transferred students from other Universities/Institutions to GCET who are on rolls are to be provided one chance to write the written test (for internal marks) in the equivalent Course(s) as per the clearance letter issued by the University.
16. Scope

1. Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”, “hers”.
2. The Academic Regulations should be read as a whole, for the purpose of any interpretation.
3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.
4. The college may change or amend the Academic Regulations, Program 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 College Authorities.
5. B. Tech (Regular) program is B. Tech 4-year degree program to which students are admitted to FIRST year.
6. B. Tech LE Scheme refers to the system under which students are admitted to SECOND year of the B. Tech FOUR (4) year degree program.
7. The terms “mid-term” and “internal” are used interchangeably.

*****
### 17. PUNISHMENT FOR MALPRACTICE

<table>
<thead>
<tr>
<th>If the candidate:</th>
<th>Nature of Malpractices</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 (a)</strong></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 course 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 course of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course only.</td>
</tr>
<tr>
<td><strong>1 (b)</strong></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 course only of all the candidates involved. In case of an outsider, he shall be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td><strong>2</strong></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 course 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.</td>
</tr>
<tr>
<td><strong>3</strong></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 courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses 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. If the impostor is an outsider, he shall be...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
<td>Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
<td>Cancellation of the performance in that course.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Refuses to obey the orders of the Chief Superintendent / Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Leaves the exam hall taking away answer script or tears of the script or any part thereof inside or outside the examination</td>
<td>Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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>
</tr>
<tr>
<td>Clause</td>
<td>Description</td>
<td>Consequence</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>7</td>
<td>hall with the mala fide intention of destroying any evidence of use of unfair means.</td>
<td>appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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>
</tr>
<tr>
<td>8</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
<td>Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College shall be handed over to police and, a police case shall be registered against them.</td>
</tr>
<tr>
<td>10</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course and all other Courses the student has already appeared for including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year.</td>
</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that Course and all other Courses the student has appeared for including practical examinations and project work of that semester/year examinations.</td>
</tr>
<tr>
<td>12</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to Chief Controller of Examination.</td>
<td></td>
</tr>
</tbody>
</table>
18. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME) FROM THE AY 2022-2023

18.1. Eligibility for award of B. Tech. Degree (LES)

1. The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.
2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from SECOND year through FOURTH year B. Tech programme (LES) for the award of B. Tech degree.
3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B. Tech
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B. Tech (LES).

18.2. Promotion rules

<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. (ii) Must have secured at least 60% of the credits specified in the program structure of second year (up to and including 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. (ii) Must have secured at least 60% of the credits specified in the program structure of third year (up to and including 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>

5. All the other regulations as applicable to B. Tech. FOUR (4) - year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).
6. LES students are not eligible for 2-year B. Tech Diploma Certificate.
### 18.3 Punishment for Malpractice

<table>
<thead>
<tr>
<th>Nature of Malpractices</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 (a)</strong> Possesses or keeps accessible in examination hall, any paper, note book,</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course only.</td>
</tr>
<tr>
<td>programmable calculators, Cell phones, pager, palm computers or any other form of</td>
<td></td>
</tr>
<tr>
<td>material concerned with or related to the course 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 course of the examination)</td>
<td></td>
</tr>
<tr>
<td><strong>1 (b)</strong> Gives assistance or guidance or receives it from any other candidate orally or</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>by any other body language methods or communicates through cell phones with any</td>
<td></td>
</tr>
<tr>
<td>candidate or persons in or outside the exam hall in respect of any matter.</td>
<td></td>
</tr>
<tr>
<td><strong>2</strong> Has copied in the examination hall from any paper, book, programmable calculators,</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.</td>
</tr>
<tr>
<td>palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.</td>
<td></td>
</tr>
<tr>
<td><strong>3</strong> 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 courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses 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</td>
</tr>
<tr>
<td></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>4</td>
<td>Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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>
</tr>
<tr>
<td>5</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td></td>
<td>Cancellation of the performance in that course.</td>
</tr>
<tr>
<td>6</td>
<td>Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td></td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.</td>
</tr>
<tr>
<td></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>7</strong></td>
<td>Leaves the exam hall taking away answer script or tears of the script or any part thereof inside or outside the examination hall with the mala fide intention of destroying any evidence of use of unfair means.</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td><strong>9</strong></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><strong>10</strong></td>
<td>Comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
<tr>
<td>12</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to Chief Controller of Examination.</td>
</tr>
</tbody>
</table>
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., - 501 301

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION OF THE INSTITUTE
Geethanjali visualizes dissemination of knowledge and skills to students, who would eventually contribute to well being of the people of the nation and global community.

MISSION OF THE INSTITUTE
1. To impart adequate fundamental knowledge in all basic sciences and engineering, technical and Inter-personal skills to students.
2. To bring out creativity in students that would promote innovation, research and entrepreneurship.
3. To Preserve and promote cultural heritage, humanistic and spiritual values promoting peace and harmony in society.

VISION OF THE DEPARTMENT
To produce globally competent and socially responsible computer science engineers contributing to the advancement of engineering and technology which involves creativity and innovation by providing excellent learning environment with world class facilities.

MISSION OF THE DEPARTMENT
1. To be a centre of excellence in instruction, innovation in research and scholarship, and service to the stake holders, the profession, and the public.
2. To prepare graduates to enter a rapidly changing field as a competent computer science engineer.
3. To prepare graduate capable in all phases of software development, possess a firm understanding of hardware technologies, have the strong mathematical background necessary for scientific computing, and be sufficiently well versed in general theory to allow growth within the discipline as it advances.
4. To prepare graduates to assume leadership roles by possessing good communication skills, the ability to work effectively as team members, and an appreciation for their social and ethical responsibility in a global setting.
PROGRAM EDUCATIONAL OBJECTIVES (PEOs):
Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to attain within a few years of graduation. The PEOs for Computer Science and Engineering graduates are:

PEO-I. To provide graduates with a good foundation in mathematics, sciences and engineering fundamentals required to solve engineering problems that will facilitate them to find employment in industry and / or to pursue postgraduate studies with an appreciation for lifelong learning.

PEO-II. To provide graduates with analytical and problem solving skills to design algorithms, other hardware / software systems, and inculcate professional ethics, inter-personal skills to work in a multi-cultural team.

PEO-III. To facilitate graduates get familiarized with state of the art software / hardware tools, imbibing creativity and Innovation that would enable them to develop cutting-edge technologies of multi-disciplinary nature for societal development.

PROGRAM OUTCOMES (POs):
Program Outcomes (POs) describe what students are expected to know and be able to do by the time of graduation to accomplish Program Educational Objectives (PEOs). The Program Outcomes for Computer Science and Engineering graduates are:

Engineering Graduates would be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **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.

PO3. **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.

PO4. **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.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **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.
PO7. **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.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **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.

PO11. **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.

PO12. **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.

**PROGRAM SPECIFIC OUTCOMES (PSOs):**
- **PSO1**: Demonstrate competency in Programming and problem solving skills and apply these skills in solving real world problems
- **PSO2**: Select appropriate programming languages, Data structures and algorithms in combination with modern technologies and tools, apply them in developing creative and innovative solutions
- **PSO3**: Demonstrate adequate knowledge in emerging technologies
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH. COMPUTER SCIENCE AND ENGINEERING

AR22 STRUCTURE

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Category</th>
<th>Credits as per GCET AR22</th>
<th>Credits as per AICTE Model Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Humanities and Social Sciences including Management Courses</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Basic Sciences Courses</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Sciences Courses including workshop, drawing, basics of electrical/mechanical/computer etc.</td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Program Core Courses</td>
<td>57</td>
<td>49</td>
</tr>
<tr>
<td>5</td>
<td>Program Elective Courses: Subjects relevant to chosen specialization/branch</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>Open Elective Courses: Electives from other technical and/or emerging subjects</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>Project work, Seminar and Internship in industry or else where</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Mandatory Courses</td>
<td>4 slots provided</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>160</td>
<td>159</td>
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</table>

COURSE CODE AND DEFINITION

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Category Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HSMC</td>
<td>Humanities and Social Sciences including Management Course</td>
</tr>
<tr>
<td>2</td>
<td>BSC</td>
<td>Basic Science Course</td>
</tr>
<tr>
<td>3</td>
<td>ESC</td>
<td>Engineering Science Course</td>
</tr>
<tr>
<td>4</td>
<td>PCC</td>
<td>Program Core Course</td>
</tr>
<tr>
<td>5</td>
<td>PEC</td>
<td>Professional Elective Course</td>
</tr>
<tr>
<td>6</td>
<td>OEC</td>
<td>Open Elective Course</td>
</tr>
<tr>
<td>7</td>
<td>PROJ</td>
<td>Project, Seminar and Internship</td>
</tr>
<tr>
<td>8</td>
<td>MC</td>
<td>Mandatory Course</td>
</tr>
</tbody>
</table>

DEFINITION OF CREDIT

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Abbreviation</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>1</td>
<td>1 Hour Lecture (L) per week</td>
</tr>
<tr>
<td>2</td>
<td>T</td>
<td>1</td>
<td>1 Hour Tutorial (T) per week</td>
</tr>
<tr>
<td>3</td>
<td>P/D</td>
<td>0.5</td>
<td>1 Hour Practical (P)/ Drawing (D) per week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2 Hours Practical (P)/ Drawing (D) per week</td>
</tr>
</tbody>
</table>
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
(Approved by AICTE, Permanently Affiliated to JNTUH and Accredited by NAAC with ‘A+’ Grade)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana – 501 301  

SCHEME OF INSTRUCTION AND EXAMINATION  
B.TECH. COMPUTER SCIENCE AND ENGINEERING  

Academic Year 2022-23  

**PROGRAM STRUCTURE**  
FIRST YEAR SEMESTER-I  

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
<th>Number of Periods per Week</th>
<th>Scheme of Examination with Maximum Marks</th>
<th>No of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L T P/D CIE SEE Tot</td>
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</tr>
<tr>
<td>1</td>
<td>20EE11001</td>
<td>Basic Electrical Engineering</td>
<td>ESC</td>
<td>3  -  -</td>
<td>40 60 100</td>
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<tr>
<td>2</td>
<td>20MA11001</td>
<td>Basic Engineering Mathematics</td>
<td>BSC</td>
<td>3  1  -</td>
<td>40 60 100</td>
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</tr>
<tr>
<td>3</td>
<td>20PH11003</td>
<td>Applied Physics</td>
<td>BSC</td>
<td>3  -  -</td>
<td>40 60 100</td>
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<tr>
<td>4</td>
<td>20ME11002</td>
<td>Engineering Graphics</td>
<td>ESC</td>
<td>2  -  2</td>
<td>40 60 100</td>
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<tr>
<td>5</td>
<td>20CS11001</td>
<td>Programming for Problem Solving-I</td>
<td>ESC</td>
<td>2  -  -</td>
<td>40 60 100</td>
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<td>6</td>
<td>20CS11L01</td>
<td>Programming for Problem Solving-I Lab</td>
<td>ESC</td>
<td>-  -  2</td>
<td>40 60 100</td>
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<td>7</td>
<td>20EE11L01</td>
<td>Basic Electrical Engineering Lab</td>
<td>ESC</td>
<td>-  -  2</td>
<td>40 60 100</td>
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<td>8</td>
<td>20ME11L01</td>
<td>Engineering Workshop</td>
<td>ESC</td>
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<td>9</td>
<td>Induction Program</td>
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<td>MC</td>
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Total Periods per Week 22
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
<th>Number of Periods per Week</th>
<th>Scheme of Examination with Maximum Marks</th>
<th>No of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20EN12001</td>
<td>English</td>
<td>HSMC</td>
<td>3 1 - - 40 L T P/D CIE SEE Tot</td>
<td>100</td>
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</tr>
<tr>
<td>2</td>
<td>20PH12001</td>
<td>Semiconductor Devices</td>
<td>BSC</td>
<td>3 1 - - 40 L T P/D CIE SEE Tot</td>
<td>100</td>
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</tr>
<tr>
<td>3</td>
<td>20MA12001</td>
<td>Multi Variable Calculus</td>
<td>BSC</td>
<td>3 1 - - 40 L T P/D CIE SEE Tot</td>
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<tr>
<td>4</td>
<td>20CS12001</td>
<td>Programming for Problem Solving-II</td>
<td>ESC</td>
<td>2 1 - - 40 L T P/D CIE SEE Tot</td>
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<tr>
<td>5</td>
<td>20CH12001</td>
<td>Engineering Chemistry</td>
<td>BSC</td>
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<td>6</td>
<td>20CS12002</td>
<td>Discrete Mathematics</td>
<td>ESC</td>
<td>3 1 - - 40 L T P/D CIE SEE Tot</td>
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<td>7</td>
<td>20PH12L01</td>
<td>Semiconductor Devices Lab</td>
<td>BSC</td>
<td>2 1 - - 40 L T P/D CIE SEE Tot</td>
<td>100</td>
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</tr>
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<td>8</td>
<td>20CS12L01</td>
<td>Programming for Problem Solving-II Lab</td>
<td>ESC</td>
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<td>9</td>
<td>20CH12L01</td>
<td>Engineering Chemistry Lab</td>
<td>BSC</td>
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<td>100</td>
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<td>10</td>
<td>20EN12L01</td>
<td>English Language Communication Skills Lab(ELCS)</td>
<td>HSMC</td>
<td>2 1 - - 40 L T P/D CIE SEE Tot</td>
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**Total**  
17 1 8 400 600 1000 22

**Total Periods per Week**  
26
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
<th>Number of Periods per Week</th>
<th>Scheme of Examination with Maximum Marks</th>
<th>No of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P/D</td>
<td>CIE</td>
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<tr>
<td>1</td>
<td>20CS21001</td>
<td>Data Structures</td>
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<tr>
<td>2</td>
<td>20EC21002</td>
<td>Digital Design</td>
<td>3</td>
<td>-</td>
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<tr>
<td>3</td>
<td>20CS21002</td>
<td>Object Oriented Programming</td>
<td>3</td>
<td>-</td>
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<tr>
<td>4</td>
<td>20MB21004</td>
<td>Engineering Economics and Accounting</td>
<td>3</td>
<td>-</td>
<td>-</td>
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<td>5</td>
<td>20CS21003</td>
<td>Database Management Systems</td>
<td>3</td>
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<td>6</td>
<td>20CS21L01</td>
<td>Data Structures Lab</td>
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<tr>
<td>7</td>
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<td>Object Oriented Programming Lab</td>
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*Activity Based Non-Laboratory Course (NO LABORATORY REQUIRED)*

**Note:** Students have to undergo internship program during the summer vacation which shall be evaluated internally during third year first semester. There is no Semester End Examination for internship.
## THIRD YEAR SEMESTER-I

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### Open Elective I

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|       | Total         |                                           |          |                           | L | T | P/D | CIE | SEE | Tot |               |
|-------|---------------|-------------------------------------------|----------|---------------------------| L | T | P/D | CIE | SEE | Tot |               |
| 5     | 20CS31L01     | Software Engineering Lab                  | PCC      | -                         | - | - | 2   | 40  | 60  | 100 | 1              |
| 6     | 20CS31L02     | Computer Networks Lab                     | PCC      | -                         | - | - | 2   | 40  | 60  | 100 | 1              |
| 7     | 20CS31L03     | Artificial Intelligence Lab               | PCC      | -                         | - | - | 2   | 40  | 60  | 100 | 1              |
| 8     | 20EN31L01     | Professional Communication Skills Lab     | HSMC     | -                         | - | - | 2   | 40  | 60  | 100 | 1              |
| 9     | 20MA31P01     | Logical Reasoning-I*                     | BSC      | -                         | - | - | 4   | 100 | -   | 100 | 2              |
| 10    | 20CS31004     | Internship                               | PROJ     | -                         | - | - | 100 | -   | 100 | -   | 2              |

**Total** | **15** | **0** | **16** | **520** | **480** | **1000** | **20** |

Total Periods per Week: 31

*Activity Based Non-Laboratory Course (NO LABORATORY REQUIRED)
## THIRD YEAR SEMESTER-II

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| Total Periods per Week | 28 |

*Activity Based Non-Laboratory Course (NO LABORATORY REQUIRED)*

**Note:** Students have to do Mini Project during the summer vacation which shall be evaluated during fourth year first semester through Semester End Examination.
## FOURTH YEAR SEMESTER-I

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| Total | 15 | 0 | 380 | 520 | 900 | 20 |

*Total Periods per Week: 25*
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**Total Periods per Week**: 31
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand the concepts of DC circuits and its analysis.
2. Understand the concepts of AC single phase circuits and its analysis.
3. Understand the concepts of single phase and three phase Transformers.
4. Understand the concepts of AC and DC machines.
5. Understand the working of various domestic electrical installation components.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Analyze and solve DC electrical circuits using Circuit laws and theorems.
CO2. Analyze and solve AC electrical circuits.
CO3. Know the construction, operation of AC and DC Machines
CO4. Analyze the characteristics of DC and AC machines.
CO5. Differentiate various domestic electrical installation components.

UNIT–I: D.C. Circuits

UNIT–II: A.C. Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series RL-C circuit.

UNIT–III: Faradays Laws of Electromagnetic Induction

UNIT–IV: Direct-Current Machines

UNIT–V: Electrical Installations
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries and their applications. Elementary calculations for energy consumption.
TEXT BOOK(S)

REFERENCE BOOK(S)
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20MA11001-BASIC ENGINEERING MATHEMATICS
B.Tech. CSE - I Year, I Sem.

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand various types of matrices, properties and rank of the matrix to find the solution for system of equations, if it exists.
2. Apply the knowledge of eigenvalues and eigenvectors of a matrix from quadratic form into a canonical form through linear transformation.
3. Solve first and higher order differential equations of various types.
4. Analyze properties of Laplace Transform, Inverse Laplace Transform and to understand how the product of the Transforms of two functions relates to their convolution.
5. Identify the methods of solving the differential equations of first and higher order applications namely, Newton's law of cooling, Natural growth and decay, Electrical circuits, Simple harmonic motion and Bending of Beams.

Course Outcomes (COs)
At the end of course, the student would be able to

CO1. Write the matrix representation of a set of linear equations and analyze solution of a system of equations using rank of a matrix.

CO2. Deduce eigenvalues and eigenvectors of a matrix and apply the same to reduce quadratic form into a canonical form through linear transformation.

CO3. Identify the type of differential equation and use the appropriate method to solve the same.

CO4. Evaluate various problems using Laplace Transform, Inverse Laplace Transform and apply the convolution theorem to obtain inverse Laplace transforms.

CO5. Apply first and higher order differential equations to solve problems like Newton's law of cooling, Natural growth and decay, Electrical circuits, Simple harmonic motion and Bending of Beams.

UNIT-I: Matrices

UNIT-II: Eigenvalues and Eigenvectors
Linear Transformation and Orthogonal Transformation: *Eigenvalues and *Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), *finding inverse and power of a matrix by Cayley-Hamilton Theorem, *Quadratic forms and Nature of the Quadratic forms, Reduction of Quadratic form to Canonical form.
UNIT-III: Ordinary Differential Equations
Second and higher order linear differential equations with Constant Coefficients: Non homogeneous of the type $e^{ax}$, $\sin ax$, $\cos ax$, $x^n$, $e^{ax}V(x)$ and $xV(x)$, Method of variation of parameters, Equations reducible to linear order differential equations with constant coefficients: Legendre’s equation, Cauchy-Euler equation.

UNIT-IV: Laplace Transforms
Definition of Laplace Transform, Existence of Laplace Transform, Laplace Transform of standard functions, first shifting theorem, Laplace Transform of functions when they are multiplied or divided by “t”, Laplace Transforms of derivatives and integrals of functions, Unit step function, second shifting theorem, Dirac’s delta function, Periodic function, Evaluation of integrals using Laplace Transforms, Inverse Laplace Transform by Partial fractions (Heaviside method), Inverse Laplace Transforms of functions when they are multiplied or divided by “s”, Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem.

UNIT-V: Applications of Ordinary Differential Equations
Applications of Higher order Ordinary Differential Equations: Electrical circuits, Simple harmonic motion, Bending of beams.
*Enlightenment with flowchart and algorithmic approach.

TEXT BOOK(S)

REFERENCE BOOK(S)
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand the fundamental concepts of quantum behavior of matter in its micro state and experimental evidence to dual nature of matter, and physical significance and application of wave function.
2. Impart the knowledge of the formation of energy bands in solids, effective mass of an electron and classification of solids.
3. Understand the characteristics of intrinsic and extrinsic semiconductors, and applications of Hall effect.
4. Understand the basic principles, construction, working and applications of various lasers and optical fibers, and causes for attenuation in optical fibers.
5. Understand different types of dielectric polarization mechanisms, properties and applications of different dielectric and magnetic materials.

Course Outcomes:
At the end of the course, student would be able to
CO1. Explain fundamental concepts of quantum behavior of matter in its micro state and experimental evidence to dual nature of matter, physical significance and applications of wave function.
CO2. Discuss the formation of energy bands in solids, effective mass of an electron and classification of solids.
CO3. Explain characteristics of intrinsic and extrinsic semiconductors, and applications of Hall effect.
CO4. Explain the basic principles, construction, working and applications of various lasers and optical fibers, and causes for attenuation in optical fibers.
CO5. Explain different types of dielectric polarization mechanisms, properties and applications of different dielectric and magnetic materials.

UNIT-I: Quantum Mechanics
Introduction to quantum physics, Black body radiation, Planck’s law (qualitative), Photoelectric effect, de-Broglie’s hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg’s uncertainty principle, Born’s interpretation of the wave function, Schrodinger’s time independent wave equation, Particle in one dimensional box.

UNIT-II: Band Theory of Solids
Electrons in a periodic potential-Bloch theorem, Kronig-Penney Model (qualitative treatment), Brillouin Zones (E-k curve), origin of energy band formation in solids, concept of effective mass of an electron, classification of materials into conductors, semiconductors and insulators.
UNIT-III: Semiconductors
Classification of semiconductors: n-type, p-type, carrier concentration in intrinsic and extrinsic semiconductors, Fermi level in intrinsic and extrinsic semiconductors, variation of Fermi level with temperature and concentration of dopants in extrinsic semiconductors, direct and indirect band gap semiconductors, Hall effect and its applications.

UNIT-IV: Lasers and Fiber Optics
Fiber Optics: Introduction, total internal reflection, acceptance angle, acceptance cone and numerical aperture, step and graded index optical fibers, losses associated with optical fibers, applications of optical fibers.

UNIT-V: Dielectric and Magnetic Properties of Materials
Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic and ionic polarizations (quantitative), orientation and space charge polarizations (qualitative). Internal fields in solids, Clausius-Mosotti equation, Ferroelectric, Piezoelectric and their applications.
Origin of magnetic moment, Bohr magneton, classification of Dia, Para, Ferro, Antiferro and Ferrimagnetic materials, domain theory of Ferro magnetism, hysteresis curve, soft and hard magnetic materials and their applications.

TEXT BOOK(S)

REFERENCE BOOK(S)
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupta on NPTEL.
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand basic concepts in engineering drawing.
2. Understand the principle of orthographic projection and isometric projection for planes and solids.
3. Draw sectional views of various solids.
5. Learn basic concepts and commands in AutoCAD.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Understand the basic principles of graphics and draw various curves in engineering drawing practice.
CO2. Draw the engineering scales and orthographic projections of points.
CO3. Draw orthographic projections of lines and planes.
CO5. Draw the Isometric views and orthographic views of various solids and basic AutoCAD commands for engineering drawings.


UNIT-II: Engineering Scales – Plain, Diagonal.
**Orthographic Projections:** Principles of orthographic Projections Conventions-Projections of Points.


UNIT-IV: Projections of Regular Solids inclined to one plane, Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone, Sphere.


**Introduction to CAD:** (For Internal Evaluation only): Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.
TEXT BOOK(S)

REFERENCE BOOK(S)
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS11001-PROGRAMMING FOR PROBLEM SOLVING-I  
B.Tech. CSE - I Year, I Sem.

Prerequisite(s): None.

Course Objectives  
Develop ability to  
1. Developing flowcharts for given problem.
2. Understand the concepts of variables, constants, basic data types and input and output statements in C programming language.
3. Understand the use of sequential, selection and repetitive statements in algorithms implemented using C programming language.
4. Understand structured design by implementing programs with functions to solve complex problems.
5. Understand the concepts related to arrays and pointers along with dynamic memory allocation using C programming language.

Course Outcomes (COs)  
After completion of the course, student would be able to  
CO1. Demonstrate problem solving skills by developing algorithms to solve problems. Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
CO2. Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
CO3. Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
CO4. Write C programs using 1D and 2D arrays.
CO5. Write C programs using pointers and also with dynamic memory allocation.

UNIT – I  
**Basics of Computers**- Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers.  
**Logic Building**: Flow chart, Algorithm, Pseudo code.  
**Introduction to Programming** – Computer Languages, Creating and running programs, Program Development.  
**Introduction to the C Language** – Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/output functions.  
**Operators** - Arithmetic, relational, logical, bitwise, conditional, increment/decrement, assignment, C program examples. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.

UNIT - II  
**Statements**- Selection Statements (decision making) – if and switch statements with C program examples.  
**Repetition statements** (loops) - while, for, do-while statements with C Program examples  
**Statements related to looping** – break, continue, goto, Simple C Program examples.
UNIT - III
Functions- Designing Structured Programs, Functions, user defined functions, inter function communication, Scope and Lifetime of variables, Storage classes-auto, register, static, extern, type qualifiers, C program examples.
Recursion- recursive functions, Limitations of recursion, example C programs

UNIT - IV
Arrays – Concepts, using arrays in C, arrays and functions, Bubble Sort, Linear Search, two – dimensional arrays-matrix addition and matrix multiplication, Declaration of Multidimensional arrays, Pre-processor Directives, C program examples.

UNIT - V
Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, void pointer, null pointer.
Pointer Applications - Arrays and Pointers, Pointer Arithmetic and arrays, passing an array to a function.
Memory allocation functions – malloc(), calloc(), realloc(), free().
Array of pointers, pointers to functions, C program examples.

TEXT BOOK(S)

REFERENCE BOOK(S)
1. Raptor-A flow charting Tool http://raptor.martincarlisle.com
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
Prerequisite(s): None.

**Course Objectives**
Develop ability to
1. Developing flowcharts for given problem.
2. Understand the concepts of variables, constants, basic data types and input and output statements in C programming language.
3. Understand the use of sequential, selection and repetitive statements in algorithms implemented using C programming language.
4. Understand structured design by implementing programs with functions to solve complex problems.
5. Understand the concepts related to arrays and pointers along with dynamic memory allocation using C programming language.

**Course Outcomes (COs)**
After completion of the course, student would be able to
CO1. Demonstrate problem solving skills by developing algorithms to solve problems. Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
CO2. Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
CO3. Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
CO4. Write C programs using 1D and 2D arrays.
CO5. Write C programs using pointers and also with dynamic memory allocation.

**LIST OF EXPERIMENTS**

**Week-1**
Introduction to RAPTOR Tool
Draw Flow chart using RAPTOR to,
   a. Read two numbers from user and calculate addition and subtraction of those numbers
   b. Read two numbers from user at the time of execution and calculate multiplication and division of those numbers
   c. Find the square of a given number (take the number from the user)
   d. Calculate the value of Y from the equation \( y = x^2 + 2x + 3 \) (read the value of X from user)
   e. Calculate the area of a Circle
   f. Find the sum of square of two numbers

**Week-2**
   a. Write a C program to perform arithmetic operations
   b. Write a C program to implement increment and decrement operators
   c. Write a C program to implement conditional operator
d. Write a C program to implement bit wise operator

Week-3
Draw Flow chart using RAPTOR tool and Implement using C program to,
   a. Check whether the given number is Positive or Negative.
   b. Check whether the given number is even or odd.
   c. Calculate the Largest of two numbers.
   d. Check the given year is leap year or not.

Week-4
Draw Flow chart using RAPTOR tool and Implement using C program to,
   a. Calculate and display the grade of a student
      i. < 30% - Fail
      ii. Between 31 and 50 – C grade
      iii. Between 51 to 60 – B grade
      iv. Between 61 to 75 – A grade
      v. Greater than 75 – distinction
   b. Find the quadratic roots of an equation (real or imaginary)
   c. Check the given number is multiple of 2, 4 and 8.

Week-5
Draw Flow chart using RAPTOR for,
   a. Displaying n numbers using looping
   b. Calculating the sum of n natural numbers
   c. Calculating sum of even numbers and odd numbers from 1 to n (n value supplied by the user)

Week-6
   a. Write a C program to implement arithmetic calculator using switch-case.
   b. Write a C program to find sum of n natural numbers.
   c. Write a C program to find sum of individual digits of the given number
   d. Write a C program to find factorial of a given number

Week-7
   a. Write a C program to check the given number is prime or not.
   b. Write a C program to check the given number is Palindrome or not.
   c. Write a C program to display the prime numbers below n.

Week-8
   a. Write a C program to find GCD and LCM of two given numbers using functions
   b. Write a C program to check the given number is Armstrong number or not using functions.

Week-9
   a. Write a C program to find the sum of prime numbers from 1 to n using functions.
   b. Write a C program to generate Fibonacci series for n number of terms.

Week-10
   a. Write a C program to find the factorial of a given number using recursive function
   b. Write a C program to generate the Fibonacci series using recursive function.
   c. Write a C program to find GCD and LCM of two numbers using recursive function.
Week-11
a. Write a C program to find largest and smallest numbers in a list of array elements using functions
b. Write a C program to sort the given list of elements in ascending order using Bubble Sort.
c. Write a C program to search for a given element in the list of array and display the “location” if the number is found else print “the number is not found”. Using fixed length and variable length array

Week-12
a. Find the duplicate elements in the list of sorted array
b. Write a C program that uses functions to perform the Addition of Two Matrices
c. Write a C program that uses functions to perform the Multiplication of Two Matrices

Week-13
a. Write a C program to swap two integers using following methods
   i. call by value
   ii. call by reference
b. Write a C program to find sum of even and odd numbers using functions and pointers

Week-14
a. Write a C program to find Largest Number Using Dynamic Memory Allocation.
b. Write a C program to return multiples values from a function using pointers
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Analyze a given network by applying various electrical laws and network theorems
2. Know the response of electrical circuits for different excitations.
3. apply physical laws to solve for unknowns like currents, voltages, impedances, etc.
4. Inspect the speed torque characteristics of DC motor
5. Inspect the speed torque characteristics Three Phase Induction Motor

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Get an exposure to basic electrical laws and theorems.
CO2. Obtain the response of different types of electrical circuits to different excitations.
CO3. Measure, calculate and relate the basic electrical parameters.
CO4. Obtain the basic torque speed characteristic of DC motor
CO5. Obtain the basic characteristics of AC machines.

List of experiments:
1. Verification of KVL and KCL
2. Verification of Superposition Theorem
3. Transient Response of Series RL and RC circuits using DC excitation
4. Calculations and Verification of Impedance and Current of RL, RC and RL Cseries circuits
5. Resonance in series RLC circuit
7. Load Test on Single Phase Transformer (Efficiency Calculations)
8. Measurement of Active and Reactive Power in a balanced Three-phase circuit
9. Torque-Speed Characteristics of a DC Shunt Motor
10. Torque-Speed Characteristics of a Three-phase Induction Motor

Additional Experiments:
1. Verification of Thevenin’s Theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
20ME11L01-ENGINEERING WORKSHOP

B.Tech. CSE - I Year, I Sem.

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
2. Impart a good basic working knowledge required for the production of various engineering products.

Course Outcomes (COs)
At the end of the course, the student would able to:

CO1. Identify and apply suitable tools for manufacturing a engineering components using different trades of engineering processes.
CO2. Explain basic operations of welding, fitting, smithy and carpentry work.
CO3. Analyze of the various electrical equipment connections and their operation
CO4. Demonstrate an understanding of and comply with workshop safety regulations.
CO5. Demonstrate and practice on machine tools and their operations

NOTE: At least TWO exercises to be done from each trade.

I. TRADES FOR EXERCISES:

A. Carpentry exercises:
   a) Making of T-lap joint from given pieces of wood as per as for the job drawing.
   b) Making of mortise and tenon joint from given pieces of wood as per as for the job drawing.
   c) Making of Bridle joint from given pieces of wood as per as for the job drawing.
   d) Making of Corner lap joint from given pieces of wood as per as for the job drawing.
   e) Making of cross lap joint from given pieces of wood as per as for the job drawing.

B. Fitting exercises:
   a) Making of L-Fitting joint from given pieces of mild steel as per as for the job drawing.
   b) Making of “V” – joint from given pieces of mild steel as per as for the job drawing.
   c) Making of “Half round” joint from given pieces of mild steel as per as for the job drawing.
   d) Making of “Dovetail” joint from given pieces of mild steel as per as for the job drawing.
   e) Making of “Square” joint from given pieces of mild steel as per as for the job drawing.
C. Tin-Smithy exercises:
   a) Making of an Open scoop with soldering from given G.I. sheet as for the job drawing.
   b) Making of Rectangular tray with soldering from given G.I. sheet as for the job drawing.
   c) Making of Cylinder with soldering from given G.I. sheet as for the job drawing.
   d) Making of Hopper with soldering from given G.I. sheet as for the job drawing.
   e) Make a funnel with soldering from given G.I. sheet as for the job drawing.

D. Black Smithy exercises:
   a) Making of an “S-Hook” from given piece of mild steel rod by hand forging.
   b) Making of “U-Hook” from given piece of mild steel rod by hand forging.
   c) Making of “C-Hook” from given piece of mild steel rod by hand forging.
   d) Making of “Flat chisel” from given piece of mild steel rod by hand forging.

E. House-wiring exercises:
   a) Practicing of Wiring for simple light circuit for controlling light/fan point (PVC conduit wiring).
   b) Practicing of Wiring for light/fan circuit using two way switches (staircase wiring).
   c) Measurement of voltage, current and power in a single phase circuit using voltmeter, ammeter and wattmeter. Calculate power factor of the circuit.
   d) Practicing of Wiring for a water pump with single phase starter.

F. Foundry exercises:
   a) Preparation of mould for the given single piece pattern with green sand.
   b) Preparation of mould for the given split piece pattern with green sand.

G. Welding Practice exercises:
   a) Preparation of simple butt joint using arc welding from given pieces of mild steel.
   b) Preparation of lap joint using arc welding from given pieces of mild steel.
   c) Preparation of corner joint using arc welding from given pieces of mild steel.

TEXT BOOK(S)
1. Workshop Practice /B. L. Juneja / Cengage

REFERENCE BOOK(S)
2. Workshop Manual / Venkat Reddy/ BSP
Course Objectives
The students would develop ability to
1. Improve the language proficiency in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Comprehend any critical aspect effectively using theoretical and practical components of English.
3. Develop Study Skills and Communication Skills in formal and informal situations.
4. Speak proficiently and listen effectively.

Course Outcomes (COs)
At the end of the course students would be able to
CO1. Infer /use the vocabulary appropriately in any situation.
CO2. Construct meaningful and explicit sentences in written form.
CO3. Acquire basic proficiency in English including reading comprehension and writing skills.
CO4. Communicate confidently in various contexts and different cultures.
CO5. Comprehend the given text and respond appropriately.
CO6. Speak proficiently and listen effectively.

UNIT–I
‘Raman effect’ from the prescribed text book ‘English for Engineers’ published by Cambridge University press.
Vocabulary Building: Etymology; The Concept of word formation, the use of Prefixes and Suffixes, One-word substitutes.
Grammar: Identifying Common Errors in writing with reference to Articles and Prepositions.
Reading: Improving Reading Comprehension skills-Techniques for effective reading.
Writing: Importance of proper Punctuation, Types of sentences-simple, compound and complex sentences.

UNIT-II
Vocabulary Building: Synonyms and Antonyms, homonyms, homophones, homographs.
Grammar: Identifying Common Errors in writing with reference to Noun-Pronoun Agreement and Subject Verb-Agreement.
Reading: Improving Reading Comprehension skills; Skimming and Scanning: Techniques for good Comprehension.
Writing: Paragraph writing: types, Structures and features of Paragraph, Creating Coherence, Organizing Principles of Paragraphs in a document, expansion of proverbs.
UNIT-III
‘Patriotism beyond politics and religion’ from ‘Ignited Minds’-unleashing the power within India by Dr. APJ Abdul Kalam-Published by Penguin Books.
Vocabulary Building: Words from Foreign Languages and their use in English-word roots.
Grammar: Identifying common errors in writing with reference to misplaced and dangling modifiers and Tenses.
Reading: Sub skills of Reading; Skimming and Scanning.

UNIT-IV
‘What should you be Eating’ from the prescribed text book ‘English for Engineers’ Published by Cambridge University press.
Vocabulary Building: Idioms and phrases, phrasal verbs.
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension-Intensive Reading and Extensive Reading, searching for implied meaning-answering the questions on theme and tone.
Writing: Writing Practices-Writing Introduction and Conclusion, Blog Writing and Responding to Blogs, Essay Writing - Précis Writing.

UNIT-V
‘How a Chinese Billionaire built her fortune’ from the prescribed text book ‘English for Engineers’ Published by Cambridge University press.
Vocabulary Building: Practice exercises.
Reading: Reading Comprehension-Exercises for Practice-unseen passages.
Writing: Technical Reports; Introduction, Characteristics of report, categories of reports, Formats, Structure of reports (Manuscript Format) and Types of Report.

TEXT BOOK(S)

REFERENCE BOOK(S)
20PH12001-SEMICONDUCTOR DEVICES
B.Tech. CSE - I Year, II Sem.

Prerequisite(s):
• 20PH11003-APPLIED PHYSICS

Course objectives
Develop ability to
1. Understand the formation of depletion region, working of p-n junction, Zener and varactor diodes, their characteristics, and breakdown mechanisms in semiconductor diodes.
3. Understand the working of rectifiers, filters and Zener diode as a voltage regulator.
4. Understand the operation of BJT, its various configurations and BJT as an amplifier.
5. Understand the need for BJT biasing, various BJT biasing methods. Understand the construction, principle and operation of JFET.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explain the formation of depletion region, working of p-n junction, Zener and varactor diodes, their characteristics, and breakdown mechanisms in semiconductor diodes.
CO2. Distinguish radiative and non-radiative recombination process in semiconductors. Explain the working and applications of optoelectronic devices: LED, semiconductor laser, solar cell, PIN, avalanche photodiodes.
CO3. Explain the working of rectifiers, filters and Zener diode as a voltage regulator.
CO4. Explain the functioning of BJT, distinguish its various configurations, and BJT as an amplifier.
CO5. Analyze the need for BJT biasing, various BJT biasing methods. Explain the construction, principle and operation of JFET. Summarize the differences between BJT and JFET.

UNIT–I: P-N junction diode
Qualitative theory of p-n junction, energy level diagrams of p-n junction in forward & reverse bias conditions, p-n junction as a diode, volt-ampere characteristics, temperature dependence of V-I characteristics, transition and diffusion capacitances (qualitative), breakdown mechanisms in semiconductor diodes, Zener diode characteristics, varactor diode characteristics.

UNIT–II: Optoelectronics
Radiative and non-radiative recombination mechanisms in semiconductors, direct and indirect band gap semiconductors, LED and semiconductor lasers: device structure, materials, characteristics. Semiconductor photodetectors: photo diode, solar cell, PIN, avalanche and their structure, materials, working principle and characteristics.
UNIT-III: Rectifiers and Filters
p-n junction diode as a rectifier, half wave rectifier, full wave rectifier, bridge rectifier, harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, π-section filter, comparison of filters, voltage regulation using Zener diode.

UNIT-IV: Bipolar Junction Transistor
Junction transistor, BJT symbol, transistor construction, BJT operation, common base, common emitter and common collector configurations. Transistor current components, limits of operation, transistor as an amplifier, comparison of CB, CE, CC amplifier configurations.

UNIT-V: Transistor biasing-stabilization and Field Effect Transistor
The DC and AC load lines, operating point, need for biasing, bias stability and stabilization factors, stabilization against variations in $V_{BE}$ and $\beta$: fixed bias, collector feedback bias, emitter feedback bias, collector-emitter feedback bias, voltage divider bias.

Field Effect Transistor: The junction field effect transistor (construction, principle of operation, symbol) pinch–off voltage, drain and transfer characteristics, comparison of BJT and FET (qualitative treatment).

TEXT BOOK(S)

REFERENCE BOOK(S)
4. Online course: “Optoelectronic materials and devices” by Monica Katiyar and Deepak Gupta on NPTEL.
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20MA12001-MULTI VARIABLE CALCULUS
B.Tech. CSE - I Year, II Sem.

Prerequisite(s):
• 20MA11001-BASIC ENGINEERING MATHEMATICS

Course Objectives
Develop ability to
1. Compute partial derivatives, composite functions of several variables and apply the methods of differential calculus to optimize multivariable functions and evaluate improper integrals using Beta and Gamma functions.
2. Evaluate definite integrals to calculate surface and volume of revolutions of curves, multiple integrals and apply the same to solve engineering problems.
3. Explain properties of vector operators to determine solenoidal and irrotational vectors, directional derivatives of vectors.
4. Determine the length of a curve, area between the surfaces and volumes of solids using vector integration.
5. Formation of Partial differential equations and various methods to solve them.

Course Outcomes (COs)
At the end of course, the student would be able to
CO1. Apply Lagrange’s method of multipliers to solve such constrained optimization problems, evaluate improper integrals.
CO2. Computesurface areas and volumes of revolutions of curves using definite integrals, multiple (Double and Triple) integrals and apply the concepts of same to find the areas and volumes.
CO3. Calculate scalar potential for a vector and directional derivative of a scalar point function.
CO4. Compute length of a curve, area between the surfaces and volumes of solids using vector integrations.
CO5. Solve problems such as one dimensional wave and heat equations that arise in engineering problems.

UNIT-I: Partial Differentiation, Applications and Beta, Gamma Functions
Definitions of Limit and Continuity, Partial differentiation, Euler’s theorem, Total derivative, Jacobian, Functional dependence and independence, *Maxima and Minima of functions of two variables and three variables using Lagrange’s method of multipliers.
Improper Integrals: Beta and Gamma functions and their applications.

UNIT-II: Multiple Integrals and Applications of Integration
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates).
Evaluation of Double Integrals (Cartesian and Polar coordinates), change of order of integration (only Cartesian form).
Evaluation of Triple Integrals, change of variables (Cartesian to Polar) for double integrals, (Cartesian to Spherical and Cylindrical Polar coordinates) for triple integrals.
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**Unit-III: Vector Differentiation**
Vector point functions and Scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and Normal line, Vector identities, Scalar potential function, Solenoidal and Irrotational vectors.

**UNIT-IV: Vector Integration**
Line, Surface and Volume Integrals. Fundamental theorems of Vector Integration: Green’s Theorem, Gauss divergence Theorem and Stoke’s Theorem (without proofs).

**UNIT-V: Partial Differential Equations**
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order Linear (Lagrangian) equation, Method of separation of variables for second order equations. Applications of Partial differential equations: One dimensional Wave equation, One dimensional Heat equation.

*Enlightenment with flowchart and algorithmic approach.

**TEXT BOOK(S)**

**REFERENCE BOOK(S)**
Course Objectives
Develop ability to
1. Understand the concepts of strings, structure, union, and enumerated types
2. Understand linear lists and their implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, quick sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams and command line arguments.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Implement string functions and use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Ability to implement linear lists in programs using C language.
CO3. Write programs that sort data using selection, quick, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions.

UNIT – I
Strings – Concepts, C Strings, String Input / Output functions, string manipulation functions, arrays of strings, string / data conversion, C program examples.
Enumerated Types – The Type Definition (typedef), Enumerated types.
Structure and Union Types – Declaration, initialization, accessing structures, operations on structures, Complex structures, Structures and functions, passing structures through pointers, self-referential structures, unions, bit fields.

UNIT – II
Linear list - Singly linked list implementation, insertion, deletion and searching operations on linear list

UNIT - III
Sorting - Selection sort, Quick Sort, Insertion sort techniques (Using Arrays)
Searching - Linear search, Binary search techniques (Using Arrays)
UNIT – IV
Queues - Introduction, Principle, Operations: Enqueue and Dequeue. (Array implementation.)

UNIT – V
File Input and Output – Concept of a file, 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. Command line arguments.
Program Development – Multi-source files, Separate Compilation of functions.

TEXT BOOK(S)

REFERENCE BOOK(S)
1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
3. Programming with C, B.Gottfried, 3rd edition, Schaum”s outlines, TMH.
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Impart the knowledge of atomic, molecular and electronic modifications for understanding properties of complexes.
2. Acquire the knowledge of various water treatment methods to resolve the problem of water hardness.
3. Understand the essential concepts of electro chemistry and corrosion with a perspective of their industrial applications.
4. Learn the synthetic aspects of drugs and polymers through organic reaction mechanisms.
5. Understand the significance of various spectroscopic techniques and their application in medical and other fields.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Apply the concepts of atomic, molecular and electronic changes for the calculation of CFSE and magnetic moments in complexes.
CO2. Analyze ground water and choose an appropriate treatment method for domestic and industrial applications.
CO3. Interpret the concepts of electrochemistry for the construction of batteries and understanding corrosion for its prevention.
CO4. Explain various reaction mechanisms and apply them in the synthesis of organic compounds of industrial significance.
CO5. Use the principles of various spectroscopic techniques in medicine and other fields.

UNIT–I: Molecular structure and Theories of Bonding

UNIT-II: Water and its treatment
UNIT-III: Electrochemistry and corrosion

UNIT-IV: Reaction Mechanisms and polymeric materials
Reaction Mechanisms
Polymeric materials
Classification of polymers, Types of Polymerization - addition and condensation, Differences between addition and condensation polymers, Mechanism of free radical addition polymerization. Preparation, properties and engineering applications of PVC, Teflon and Nylon- 6, 6.

UNIT-V: Spectroscopic techniques and applications

TEXT BOOK(S)

REFERENCE BOOK(S)
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS12002-DISCRETE MATHEMATICS
B.Tech. CSE - I Year, II Sem.

Prerequisite(s): None

Course Objectives
Enable student to
1. Understand concepts of Mathematical Logic, mechanisms of inference rules for propositional and predicate logic and their applications.
2. Understand the concepts of Sets, Relations, Functions and their applications.
3. Learn the concepts of Algebraic Structures, basics of counting, Principles of inclusion/exclusion and the pigeonhole methodology.
4. Understand Generating Functions, Recurrence Relations and various ways of solving them.
5. Understand basic definitions and properties of graphs and their applications in computer science and engineering.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Distinguish between Propositional Logic and Predicate Logic, deriving valid proofs of inference and checking the validity of inferences.
CO2. Illustrate by examples the basic terminology of sets, relations, functions and algebraic structures along with their associated operations.
CO3. Demonstrate basics of counting, principles of permutations, combinations, applying inclusion/exclusion principle and the pigeonhole methodology in solving counting problems.
CO4. Demonstrate Generating functions, write recurrence relations and apply various techniques solving recurrence relations.
CO5. Transform a problem in computer science and engineering as a graph to solve it efficiently using concepts of graph theory.

UNIT-I

UNIT-II
Set Theory: Basic concepts of set theory, Properties of Binary Relations, equivalence, transitive closure, compatibility and partially ordered set, Hasse diagram, Lattices, Functions, Inverse Function, Composition of functions, recursive Functions.

UNIT-III
Algebraic structures: Algebraic Systems Examples and General Properties, Semi groups and Monoids, Groups, Homomorphisms. Elementary Combinatorics -Basis of Counting, Combinations & Permutations, Enumeration of combinations and permutations -with Repetitions -with Constrained repetitions, Binomial Coefficients, The Binomial and

UNIT-IV
Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating Functions, The Method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT-V
Graph Theory: Basic Concepts, Isomorphisms and Sub graphs, Trees and Their Properties, Spanning Trees, Planar Graphs, Euler’s Formula, Multi graphs and Euler’s Circuits, Hamiltonian graphs, Chromatic Numbers, The Four-Color Problem.

TEXT BOOK(S)

REFERENCE BOOK(S)
5. Logic and Discrete Mathematics, Grass Man & Trembley, Pearson Education.
Course Objectives
Develop ability to

1. Determine magnetic induction at several points on the axis of circular coil carrying current.
2. Determine time constant of a RC circuit, energy gap of a given semiconductor, Hall coefficient, work function of a given photo sensitive material.
3. Plot V-I characteristics of LED, LASER, p-n junction and Zener diode, understand rectification process and working of rectifier, understand the conversion of light into electrical energy.
4. Plot the characteristics of transistor in different configurations.
5. Plot drain and transfer characteristics of a Field Effect Transistor (FET).

Course Outcomes (COs)
After completion of the course, student would be able to

CO1. Summarize working principle of electromagnetic induction.
CO2. Compute time constant of RC circuit, energy gap of semiconductor, work function of a given photo sensitive material, and identify type of semiconductor.
CO3. Demonstrate the V-I characteristics of LED, LASER, p-n junction diode, the application of Zener diode as voltage regulator and conversion of ac to dc with and without filters, exhibits knowledge in developing various applications of solar cells.
CO4. Evaluate current gain of a given n-p-n transistor.
CO5. Analyze the drain and transfer characteristics of FET in common source configuration.

Any ten of the following twelve experiments are mandatory to perform by each student

1. Determination of Planck’s constant using the V-I characteristics of LED.
2. Draw the V-I characteristics of a given source of LASER.
3. Determination of time constant of a given RC combination.
4. Determination of energy gap of a given semiconductor using p-n diode.
5. Plot the V-I characteristics of p-n junction diode and Zener diode.
6. Plot the input and output characteristics of n-p-n transistor - CE and CB configurations.
7. Conversion of ac to dc using full wave rectifier with and without filters.
8. Plot the drain and transfer characteristics of FET.
9. Plot the V-I characteristics of a Solar cell.
10. Determination of Hall coefficient and carrier density of a given semiconductor.
11. Determination of work function of a given photo sensitive material.
12. Determination of magnetic field along the axis of a current carrying circular coil using Stewart and Gee’s apparatus.
B.Tech CSE

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS12L01-PROGRAMMING FOR PROBLEM SOLVING-II LAB
B.Tech. CSE - I Year, II Sem.

Prerequisite(s):
- 20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I LAB

Course Objectives
Develop ability to
1. Understand the concepts of strings, structure, union, and enumerated types
2. Understand linear lists and their implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, quick sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams and command line arguments.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Implement string functions and use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Ability to implement linear lists in programs using C language.
CO3. Write programs that sort data using selection, quick, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions.

LIST OF EXPERIMENTS
WEEK-1
a. Write a C program to find whether a given string is palindrome or not.
b. Write a C program to insert characters at a given location in a given string.
c. Write a C program to delete characters from a given string and position
d. Write a C program to print the number of vowels and consonants using Strings

WEEK-2
a. Write a C program to convert Roman number to Decimal Number.
b. Write a C program to find the 2’s Compliment of a given string
c. Write a C program to Reverse a String by Passing it to function
d. Write a C Program to Input a String with at least one Number, Print the Square of all the Numbers in a String

WEEK-3
a. Write a C program to implement complex structures for the following operations.
   i. Addition of two Complex numbers
   ii. Multiplication of two Complex Numbers
WEEK-4
a. Write a C program to implement arrays of structures?
b. Write a C program to implement bit fields in C?

WEEK-5
a. Write a C Program to store the information (name, roll no, and branch) of a student using unions.
b. Write a C program to implement inter function communication by passing pointers to a structure.

WEEK-6
a. Write a C program to implement singly linked list for the following operations.
   i) Insertion   ii) Deletion   iii) Search

WEEK-7
a. Write a C program to sort the elements using Selection sort
b. Write a C program to sort the elements using Quick sort.

WEEK-8
a. Write a C program to sort the elements using Insertion sort
b. Write a C program to search a string in a list of strings using linear search. If the string is found display the position, otherwise print “string not present”.

WEEK-9
a. Write a C program to search an element in a list of elements using Binary search. If the element is found, display the position, otherwise print “element not present”.

WEEK-10
a. Write a C program convert infix to postfix notation and postfix evaluation using stack.

WEEK-11
a. Write a C program implement Queue using arrays for the following operations.
   i) Enqueue   ii) Dequeue   iii) Peek   iv) Display

WEEK-12
a. Write a C program open a new file and implement the following I/O functions.
   i) fprintf(), fscanf()  
   ii) getw(), putw()  
   iii) getc(), putc()

WEEK-13
a. Write a C program to copy data from one file to another.
b. Write a C program to merge two files, using command line arguments.

WEEK-14
a. Write a C program to implement multi file programming for basic arithmetic operations
Course Objectives
Develop ability to
1. Estimate the hardness content in water and check its suitability for drinking purpose.
2. Use instrumental methods namely, Potentiometry and Conductometry to find the concentration of a given solution.
3. Measure physical properties like surface tension, adsorption, acid value and viscosity.
4. Explain the synthesis of simple drug molecules such as Aspirin.
5. Determine the rate constant of reactions from concentrations as a function of time.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Determine parameters like hardness content in water and validate water for its potability.
CO2. Find the concentration of given solution using instrumental techniques such as Potentiometry and Conductometry.
CO3. Determine physical properties like surface tension, adsorption, acid value and viscosity.
CO4. Use preparatory techniques which are fundamental in the synthesis of Aspirin.
CO5. Estimate the rate constant of a reaction from concentration – time relationship.

List of Experiments
I. Titrimetry
1. Determination of total hardness of water by complexometric method using EDTA.
2. Determination of acid value of coconut oil.

II. Instrumental Methods
A. Potentiometry
3. Estimation of HCl by Potentiometric titrations.
4. Estimation of Fe^{2+} by Potentiometry using KMnO_{4}.

B. Conductometry
5. Estimation of HCl by Conductometric titrations.

III. Physical Constants
7. Determination of viscosity of a given liquid by using Ostwald’s Viscometer.
8. Determination of surface tension of a given liquid using Stalagmometer.

IV. Synthesis
V. Kinetics
10. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.

VI. Additional Experiments
11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal.
12. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCE BOOK(S)
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20EN12L01-ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (ELCS)
B.Tech. CSE - I Year, II Sem.

Prerequisite(s): None.

Course Objectives
Students would develop the ability to
1. Facilitate computer-assisted multimedia instruction enabling individualized and independent language learning.
2. Sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. Bring about a consistent accent and intelligibility in students’ pronunciation of English by providing an opportunity for practice in speaking.
4. Improve the fluency of students in spoken English and neutralize their Mother Tongue Influence.
5. Train students to use language appropriately for public speaking and interviews.

Course Outcomes (COs)
At the end of the course students would be able to
CO1. Listen actively, speak fluently and write accurately.
CO2. Speak with clarity and confidence reducing MTI and enhance Employability Skills.
CO3. Demonstrate better understanding of nuances of English Language.
CO4. Communicate intelligibly at workplace.
CO5. Perform effectively in Interviews.
CO6. Plan and present ideas explicitly.

English Language and Communication Skills Lab (ELCS) shall have two parts:
   a. Computer Assisted Language Learning (CALL) Lab
   b. Interactive Communication Skills (ICS) Lab

MODULE-I
CALL Lab:
Understand: Listening: Listening Skill-Its importance-Purpose-Process-Types-Barriers to Listening.
Practice: Introduction to Phonetics-Speech Sounds-Vowels and Consonants-Minimal pairs.

ICS Lab:
Understand: Communication at Work Place-Spoken vs. Written language.
Practice: Speaking: Ice-Breaking Activity and JAM Session. Know your partner activity.

MODULE-II
CALL Lab:
Practice: Basic Rules of Word Accent-Stress Shift-Weak Forms and Strong Forms in Context.

ICS Lab:
Practice: Speaking: Telephone Etiquette, Situational Dialogues-Greetings-Taking Leave-Making request and seeking permission-Introducing oneself and others.

MODULE-III
CALL Lab:
Understand: Listening: Intonation; Errors in pronunciation-The interference of Mother Tongue (MTI) examples from different parts of the country.
Practice: Common Indian Variants in Pronunciation- Differences in British and American Pronunciation.

ICS Lab:
Understand: How to make Formal Presentations.

MODULE-IV
CALL Lab:
Understand: Listening for General Details. (2 practice exercises)
Practice: Listening Comprehension Tests. (2 practice exercises)

ICS Lab:
Understand: Public Speaking-Debate-Exposure to Structured talks.

MODULE-V
CALL Lab:
Understand: Listening: Listening for Specific Details. (2 practice exercises)
Practice: Listening Comprehension Tests. (2 practice exercises)

ICS Lab:
Understand: Speaking: General Interview Skills.
Practice: General Interview Strategies and Skills.

TEXT BOOK(S)
2. ELCS Lab Manual prepared by Faculty, Department of English, GCET.

REFERENCE BOOK(S)
Course Objectives
Develop ability to
1. Understand the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
2. Identify the notations used to represent the Performance of algorithms.
3. Understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
4. Familiarize with various data structures for various applications.
5. Understand various searching and sorting algorithms.
6. Write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Explain the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
CO2. Calculate the performance of the different algorithms in terms of time and space.
CO3. Write programs in C for different data structures like stacks, queues, linked lists(singly and doubly).
CO4. Select appropriate data structure for a given problem.
CO5. Write C programs for various searching algorithms, sorting algorithms and non-linear data structures such as trees and graphs.

UNIT- I
Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations.

UNIT- II
Stack ADT, definition, operations, linked list implementation, Application of stack – Tower of Hanoi, Parenthesis Checker iterative and recursion implementation.

Queue ADT, definition and operations, linked list implementation, Circular queues- Insertion and deletion operations, Deque (Double ended queue) ADT, array and linked implementations.
UNIT- III
Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees.

Max Priority Queue ADT - implementation-Max Heap-Definition, Insertion into a MaxHeap, Deletion from a Max Heap.
Sorting- Merge sort, Heap Sort, Radix Sort, Binary insertion sort Comparison of Sorting methods.

UNIT- IV
Search Trees - Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees- Definition and Examples, Insertion into an AVL Tree
B-Trees - Definition, B-Tree of order m, operations-Insertion and Searching, Introduction to Red-Black and Splay Trees, Comparison of Search Trees.

UNIT-V
Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multi lists, Graph traversals- DFS and BFS.

TEXT BOOK(S)

REFERENCE BOOK(S)
B.Tech. CSE - II Year, I Sem.

Course Objectives
Develop ability to
1. Understand basic concepts of various number systems used in digital systems.
2. Understand Boolean algebra and various Boolean simplification theorems.
3. Understand simplification of Boolean functions using k-map and tabular method.
4. Understand design and analysis of combinational and sequential logic circuits.
5. Understand symmetric functions and design the same using relay contacts.
6. Understand Threshold logic and design switching functions using threshold elements.

Course Outcomes (COs)
At the end of the course, the student would be able to
CO1. Perform conversions from one number system to another.
CO2. Simplify switching functions using Boolean minimization theorems, map method and tabulation method.
CO3. Analyze and design combinational logic circuits and the effect of Static Hazards on these circuits.
CO4. Synthesize symmetric functions using relay contact networks.
CO5. Design switching circuits using threshold elements.
CO6. Analyze and design Sequential logic Circuits.

UNIT – I: Number Systems
**Number Systems**, Base Conversion Methods, Binary arithmetic, Complements of Numbers, Codes-Binary Codes, Binary Coded Decimal (BCD) Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.


UNIT-II: Minimization of switching functions

UNIT-III: Design of Combinational Circuits
UNIT-IV: Synthesis of Symmetric Networks
Relay Contacts, Analysis and Synthesis of Contact Networks, Symmetric Networks, Identification of Symmetric Functions and realization of the same.
Threshold Logic: Threshold Element, Capabilities and Limitations of Threshold logic, Elementary Properties, Synthesis of threshold networks (Unate function, Linear seperability, Identification and realization of threshold functions, Map based synthesis of two-level Threshold networks).

UNIT-V: Sequential Machines Fundamentals
Counters and Shift Registers: Ripple Counter, Shift Registers and their types, Ring Counters, Twisted Ring Counters.

TEXT BOOK(S)

REFERENCE BOOK(S)
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand basic concepts of object oriented programming.
2. Understand the primitive data types built into the Java language and features of strongly typed language.
3. Learn scope, lifetime, and the initialization mechanism of variables and parameter passing mechanisms.
4. Write simple graphics programs involving drawing of basic shapes.
5. Create Graphical User Interfaces by means of Java Programming Language.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Use concepts of OOPs such as data abstraction, inheritance, polymorphism, encapsulation and method overloading principles in structuring computer applications for solving problems.
CO2. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
CO3. Use Java Collection of Application Programming Interface (API) as well as the Java standard class library with necessary exception handling mechanisms in constructing computer applications.
CO5. Design and develop Graphical User Interface applications using Abstract Window Toolkit (AWT) and Swings.

UNIT-I
OOP concepts - Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, procedural and Object oriented programming paradigms.
Java Programming - History of Java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow block scope, conditional statements, loops break and continue statements. simple java program, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors recursion, garbage collection, building strings, exploring string class
UNIT-II
Inheritance - Definition, hierarchies, super and subclasses, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods. Polymorphism - Dynamic binding, method overriding, abstract classes and methods. Interfaces - Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.
Inner classes - Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.
Packages - Definition, Creating and Accessing a package, understanding CLASSPATH, importing packages.

UNIT-III
Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.
Multi-Threading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication, producer consumer pattern.

UNIT –IV
Event handling - Events, event sources, event classes, event Listeners, Relationship between event sources and Listeners Delegation event model, Examples: handling a button click, handling mouse events, Adapter classes.

UNIT –V
Connecting to Database - JDBC type 1 to 4 drivers, connecting to a data base, querying a data base and processing the results, updating data with JDBC.
Files: streams – byte streams, character streams, text input/ Output binary input/ output Random access file operations, file management using File class
Collection Frame work in java - Introduction to java Collections, overview of java collection frame work, Generics, commonly used collection classes- ArrayList, Vector, Hash table, Stack, Enumeration, Iterator, StringTokenizer.

TEXT BOOK(S)
REFERENCE BOOK(S)
1. Core Java 2–Volume 1, Cay S. Horstmann and Gary Cornell
4. Thinking in Java, Bruce Eckel, Pearson Education.
Prerequisite(s): None.

Course Objectives
Develop the ability to
1. Learn the basic Business types
2. Understand the impact of the Economy on Business and Firms specifically.
3. Analyze the Business from the Financial Perspective.
4. Understand the importance of handling Capital.
5. Learn fundamental concepts of accounting.

Course Outcomes (COs)
The students will able to
CO1. Understand Business and the impact of economic variables on them.
CO2. Understand the Demand, Supply concepts.
CO3. Analyze the Production, Cost, Market Structure, Pricing aspects.
CO4. Understand capital structure.
CO5. Study the Financial Statements of a Company.

UNIT–I

UNIT-II
Demand and Supply Analysis: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III
Production, Cost, Market Structures & Pricing: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.
UNIT-IV

UNIT-V

TEXT BOOK(S)

REFERENCE BOOK(S)
Prerequisite(s):

- 20CS12001-PROGRAMMING FOR PROBLEM SOLVING-II

Course Objectives:

Develop ability to

1. Learn and practice data modeling using entity-relationship and develop database design.
2. Understand the features of database management systems and Relational database.
3. Understand Structured Query Language (SQL) and learn SQL syntax.
4. Understand normalization process of a logical data model and correct any anomalies.
5. Understand needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Differentiate DBMS from traditional data storage mechanisms.
CO2. Design and describe data models and schemas in DBMS.
CO3. Use SQL- the standard language of relational databases, for database processing.
CO4. Design a normalized database resolving various problems like redundant and functional dependencies.
CO5. Implement Transaction and Query processing techniques for data storage and retrieval.

UNIT I

Introduction: Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models, Introduction to Data base design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises, database Access for applications Programs, Data Storage and Querying, data base Users and Administrator, data base System Structure, History of Data base Systems. Database Languages – DDL, DML, DCL.


UNIT II


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

UNIT III
Introduction to Schema refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Function dependencies- reasoning about FDS,

UNIT IV
Concurrency Control - Lock –Based Protocols – Timestamp Based Protocols- Validation-Based Protocols – Multiple Granularity.

UNIT V
Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree base Indexing, Comparison of File Organizations.
Hash Based indexing: Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOK(S)

REFERENCE BOOK(S)
3. Introduction to Database Systems, C.J.Date, Pearson Education
20CS21L01-DATA STRUCTURES LAB
B.Tech. CSE - II Year, I Sem.

Prerequisite(s):
- 20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I LAB
- 20CS12L01-PROGRAMMING FOR PROBLEM SOLVING-II LAB

Course Objectives

Develop ability to
1. Understand the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
2. Identify the notations used to represent the Performance of algorithms.
3. Understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
4. Familiarize with various data structures for various applications.
5. Understand various searching and sorting algorithms.
6. Write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes (COs)
After completion of the course, student would be able to

CO1. Explain the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
CO2. Calculate the performance of the different algorithms in terms of time and space.
CO3. Write programs in C for different data structures like stacks, queues, linked lists(singly and doubly).
CO4. Select appropriate data structure for a given problem.
CO5. Write C programs for various searching algorithms, sorting algorithms and non-linear data structures such as trees and graphs.

1. Write a C program for polynomial addition using linked lists
2. Write a C program that uses functions to perform the following:
   a. Create circularly linked lists
   b. Delete a given integer from the above linked list.
   c. Display the contents of the above list after deletion.
3. Write a C program that uses functions to perform the following:
   a. Create a doubly linked list of integers.
   b. Delete a given integer from the above doubly linked list.
   c. Display the contents of the above list after deletion
4. Write C programs to implement a Stack and Queue ADT using singly linked list.
5. Write a C program to implement the following by using stack
   a. Towers of Hanoi.
   b. Parenthesis Checker
6. Write a C program to implement Circular Queue
7. Write C programs to implement a double ended queue ADT using linked list.
8. Write a C program that uses functions to perform the following:
   a. Create a binary search tree of integers.
   b. Traverse the above Binary search tree in in-order, pre-order, post-order.
9. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:
   a. Merge Sort
   b. Heap Sort
10. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:
    a. Radix Sort
    b. Binary insertion sort
11. Write a C program to perform the following operation:
    a. Insertion into a B-tree.
    b. Searching a B-Tree
12. Write C programs for implementing the following graph traversal algorithms:
    a. Depth first traversal
    b. Breadth first traversal
13. Write a C program to implement all the functions of a dictionary (ADT) using hashing
14. Write a C program for pattern matching algorithm (KMP).
20CS21L02-OBJECT ORIENTED PROGRAMMING LAB
B.Tech. CSE - II Year, I Sem.

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand basic concepts of object oriented programming.
2. Understand the primitive data types built into the Java language and features of strongly typed language.
3. Learn scope, lifetime, and the initialization mechanism of variables and parameter passing mechanisms.
4. Write simple graphics programs involving drawing of basic shapes.
5. Create Graphical User Interfaces by means of Java Programming Language.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1. Use concepts of OOPs such as data abstraction, inheritance, polymorphism, encapsulation and method overloading principles in structuring computer applications for solving problems.
CO2. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
CO3. Use Java Collection of Application Programming Interface (API) as well as the Java standard class library with necessary exception handling mechanisms in constructing computer applications.
CO5. Design and develop Graphical User Interface applications using Abstract Window Toolkit (AWT) and Swings.

LIST OF PROGRAMS

Week 1: (Basic programs to get used to java syntax)
Write a Java program to
a. Print the Fibonacci series upto the given number.
b. Print the reverse of the given number
c. Find factorial of the given number at command line.
d. Prompt the user for an integer and then prints out all prime numbers up to that integer

Week 2: Write a Java program to
a. Check whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
b. Sort a given list of names in ascending order.
c. Find frequency count of words in a given text.
Week 3: Write a java program to
a. Illustrate creation of classes and objects
b. Illustrate constructor and method overloading
c. Create a stack ADT

Week 4: Write a java program to
a. Implement different types of inheritance
b. Illustrate method overriding and Dynamic method dispatch
c. Illustrate static keyword with variables and methods

Week 5: Write a java program to
a. Create an interface for stack of integers with abstract methods push, pop and display.
   Write an implementation of the above mentioned abstract methods for a fixed size stack
   and a dynamic size stack.
b. Illustrate inner classes

Week 6: Write a java program to
a. Illustrate usage of try, catch, finally with multiple exceptions
b. Create user defined exceptions.

Week 7: Write a java program to
a. Create a thread by implementing Runnable interface.
b. Implement producer consumer problem using the concept of inter thread communication.

Week 8:
Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons
for the digits and for the +, -, *, % operations. Add a text field to display the result.

Week 9:
Write a java program that handles all mouse events and shows the event name at the center of
the window when a mouse event is fired.

Week 10:
Write a program that creates a user interface to perform integer divisions. The user enters two
numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in
the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the
program would throw a Number Format Exception. If Num2 were Zero, the program would
throw an Arithmetic Exception Display the exception in a message dialog box.

Week 11:
a. Write a java program that simulates a traffic light. The program lets the user select one of
   three lights: red, yellow, or green. When a radio button is selected, the light is turned on,
   and only one light can be on at a time No light is on when the program starts.
b. Write a Java program that allows the user to draw lines, rectangles and ovals.
Week 12:
Write a java program to create an abstract class named Shape that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides() that shows the number of sides in the given geometrical figures.

Week 13:
a. Write a java Program that loads names and phone numbers from a text file where the data is organized as one line per record and each filed in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
b. Implement the above program with database instead of a text file.

Week 14:
a. Write a java Program that takes tab separated data (one record per line) from a text file and inserts them into a database.
b. Write a java program that prints the meta-data of a given table.
c. Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.
Prerequisite(s): None

Course Objectives:
Develop ability to
1. Learn and practice data modeling using entity-relationship and develop database design.
2. Understand the features of database management systems and Relational database.
3. Understand Structured Query Language (SQL) and learn SQL syntax.
4. Understand normalization process of a logical data model and correct any anomalies.
5. Understand needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcomes (COs):
After completion of the course, student would be able to
CO1. Differentiate DBMS from traditional data storage mechanisms.
CO2. Design and describe data models and schemas in DBMS.
CO3. Use SQL - the standard language of relational databases, for database processing.
CO4. Design a normalized database resolving various problems like redundant and functional dependencies.
CO5. Implement Transaction and Query processing techniques for data storage and retrieval.

List of Experiments
1. E-R Model: Analyze the problem with the entities which identify data persisted in the database which contains entities, attributes.
2. Concept design with E-R Model: Apply cardinalities for each relationship, identify strong entities and weak entities for relationships like generalization, aggregation, specialization.
3. Relation Model: Represent attributes as columns in tables and different types of attributes like Composite, Multi-valued, and Derived. Apply Normalization.
4. Installation of MySQL and Queries using DATA DEFINITION LANGUAGE (DDL) COMMANDS - Create, Alter, Drop, Truncate
5. Data Manipulation Language (DML) COMMANDS: - SELECT, INSERT, UPDATE, DELETE
6. Data Control Language (DCL): - GRANT, REVOKE
Transaction Control Language (TCL) COMMANDS: - COMMIT , ROLL BACK SAVE POINT
7. In Built Functions: - DATE FUNCTION, NUMERICAL FUNCTIONS, CHARACTER FUNCTIONS, CONVERSION FUNCTION
8. Querying: Queries using ANY, ALL, IN, INTERSECT, UNION

9. Querying: Using aggregate functions COUNT, SUM using GROUPBY and HAVING
   a. Using aggregate functions AVERAGE using GROUPBY and HAVING

10. Querying: NESTED QUERIES AND JOIN QUERIES: Nested Queries, Correlated sub queries, Simple Join, a) Equi-join b) Non Equi-join, Self join, Outer Join

11. Set Operators: Union, Union all, Intersect, Minus

12. Views: Creating and dropping view

13. Triggers: Creation of INSERT TRIGGER, DELETE TRIGGER, UPDATE TRIGGER

14. Procedures: Creation, Execution and Modification of stored Procedure

15. Database Design and Implementation: MINI DATABASE PROJECT
Course Objectives
Students would develop ability to
1. Delineate the contextual meaning of various words and their functions in a sentence.
2. Equip themselves with English language skills related to Vocabulary.
3. Improve English language proficiency with an emphasis on Reading skills.
4. Develop study skills related to Critical Writing.

Course Outcomes (COs)
The students would be able to
CO1. Use words contextually and to communicate effectively.
CO2. Comprehend passages and make the right inferences.
CO3. Apply critical thinking abilities to make reasoned conclusions.
CO4. Inculcate the habit of using advanced vocabulary to be expressive.

MODULE-I
History of Words
Etymology: Word Origin, Advanced word roots, words borrowed from different languages to English, Portmanteau words, also called blended words (new coinage of words), assimilation of words.

MODULE-II
Word Analogy
Vocabulary: Same words with different meaning and different words with same meaning, Analogies: different relationships: worker and tools, worker and article, time sequence, cause and effect, class and species, synonyms, antonyms, person and things sought or avoided, part to the whole and symbols that stand for, degree of intensity, parts of speech.

MODULE-III
Comprehension Techniques
Reading: Reading for facts, opinions and inferences, reading for critical understanding, addressing point of view of the author/writer, jumbled paragraphs.

MODULE-IV
Sentence Equivalence
Writing: sentence completion, Picture perspective: critical thinking, individual perception and obtaining implications.

Classroom Activity based Course. Hence, Lab. is not required.
TEXT BOOK(S)

REFERENCE BOOK(S)
Prerequisite(s): None.

Course Objectives
Develop ability to
1. Identify the importance of ecosystem and its functions.
2. Understand the concept of bio-diversity, its values and conservation.
3. Be aware of the causes of different types of pollution and its control.
4. Understand various environmental impacts, requirement of various policies, and legislations towards environmental sustainability.

Course Outcomes (COs)
After the completion of the course, the student would be able to

CO1. Explain ecosystem and its functions namely, food chain, ecological pyramids etc.

CO2. Acquire knowledge about different types of natural resources such as land, water, minerals, non-renewable energy and their excessive usage leading to detrimental effects on environment.

CO3. Comprehend ecosystem diversity, its values and importance of hot spots to preserve the same.

CO4. Explain different types of pollution, its control and impact on global environment.

CO5. Recognize various environmental impacts and the importance of various acts and policies towards environmental sustainability.


UNIT–II: Natural Resources: Classification of Resources: Living and Non-Living resources, Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy Resources-renewable and non-renewable.


UNIT–IV: Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution:Sources and types of


**TEXT BOOK(S)**
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

**REFERENCE BOOK(S)**
4. Environmental Studies by R. Rajagopalan, Oxford University Press.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.
20CS22001-DESIGN AND ANALYSIS OF ALGORITHMS

B.Tech. CSE - II Year, II Sem.

Prerequisite(s):
- 20CS12002-DISCRETE MATHEMATICS
- 20CS21001-DATA STRUCTURES

Course Objectives

Develop ability to
1. Learn the asymptotic notations and understand the performance of algorithms.
2. Learn the behavior of Greedy strategy, Divide and Conquer approach, Dynamic Programming and branch and bound theory and apply them for several problem solving techniques.
3. Explore various data structures and algorithm design methods together impacts the performance of programs.
4. Distinguish between deterministic and non-deterministic algorithms and their computational efficiency.

Course Outcomes (COs)
After completion of the course, student would be able to

CO1. Analyze algorithms and estimate their best-case, worst-case and average-case behaviour in terms of time and space and execute the same through programming.
CO2. Prove the correctness of an algorithm and check whether the algorithm found is the most efficient for solving problems employing trees, graphs and disjoint sets.
CO3. Identify suitable problem solving technique for a given problem and design algorithms using greedy strategy, divide and conquer approach, and dynamic programming and execute the same through programming.
CO4. Identify suitable problem solving technique for a given problem and design algorithms using backtracking, and branch and bound theory and execute the same through programming.
CO5. Design deterministic and non-deterministic algorithms for tractable and intractable problems and categorize them as P Class/ NP Class/ NP-Hard/ NP-complete problems accordingly.

UNIT-I
INTRODUCTION: Algorithm, Pseudo code for expressing algorithms, Performance analysis, Time complexity and space complexity, Asymptotic Notations: O notation, Omega notation, theta notation, and little o notation.
DIVIDE AND CONQUER: General method, applications – binary search, merge sort, quick sort, Strassen’s matrix multiplication.

UNIT-II
SEARCHING AND TRAVERSAL TECHNIQUES: Efficient non-recursive binary tree traversal algorithms, spanning trees, graph traversals- BFS and DFS, Connected components, bi-Connected components.
Disjoint sets: operations, union and find algorithms.
UNIT-III
GREEDY-METHOD: General method, Applications-Job sequencing with deadlines, 0/1 knapsack problem, minimum cost spanning tree, single source shortest path problem.
DYNAMIC PROGRAMMING: General method, applications-multistage graphs, matrix chain multiplication, optimal binary search trees, 0 /1 knapsack problem, travelling sales person problem, reliability design problem.

UNIT-IV
BRANCH and BOUND: General method, applications: Job Sequencing with deadlines, travelling sales person problem, 0 /1 knapsack problem, LC branch and bound, FIFO branch and bound solution.

UNIT-V
NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP-hard and NP-complete classes, NP-Hard problems, Cook’s theorem.

TEXT BOOK(S)

REFERENCE BOOK(S)
4. Algorithms-Richard Johnson baugh and Marcus Schaefer, Pearson Education
5. Design and Analysis Algorithms-Parag Himanshu Dave, Himanshu Bhalachandra Dave Publisher: Person
Prerequisite(s):
- 20EC21002-DIGITAL DESIGN

Course Objectives
1. To introduce principles of computer organization and the basic architectural concepts.
2. Recommend instruction formats, addressing modes, micro instructions for design of control unit
3. Write assembly level programs using 8086 microprocessor.
4. Understand the I/O and memory organizations of a Computer system
5. Recognize different parallel processing architectures

Course Outcomes (COs)
CO1. Demonstrate an understanding of the design of the functional units of a digital computer system.
CO2. Design micro instructions for different kinds of CPU organizations with proper understanding of instruction formats and addressing modes
CO3. Write assembly language programs using 8086 microprocessor with the knowledge of pin diagram, registers and instruction formats of 8086 microprocessor.
CO4. Identify different hardware components associated with the memory and I/O organization of a computer
CO5. Differentiate different parallel processing architectures

UNIT - I

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Instruction cycle.

UNIT - II
Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Program Control, Program interrupts, CISC Characteristics, RISC Characteristics.

UNIT-III
8086 Architecture: Register Organization of 8086, 8086 Architecture, Signal Description of 8086, Physical Memory Organization, Pipelining in 8086, 8086 Flag Registers.
8086 Instruction Set and Assembler Directives: Instruction Formats and Addressing Modes of 8086, Instruction Set, Assembler Directives, Assembly Language Programs

UNIT - IV
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Hit and Miss ratio, associative mapping, direct mapping, set-associative mapping, Writing into cache.

UNIT - IV
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.
Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication and synchronization, Cache Coherence.

TEXT BOOK(S)

REFERENCE BOOK(S)
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301  

20CS2203-OPERATING SYSTEMS  
B.Tech. CSE - II Year, II Sem.  

Prerequisite(s):  
- 20CS11001-PROGRAMMING FOR PROBLEM SOLVING-I  

Course Objectives  
Develop ability to  
1. Understand main components of Operating System (OS) and their working.  
2. Implement the different CPU scheduling policies, and process synchronization.  
3. Apply the different memory management techniques.  
4. Understand File management techniques.  
5. Handing Deadlock situations and provide system protection.  

Course Outcomes (COs)  
At the end of the course, student would be able to  
CO1. Compare synchronous and asynchronous communication mechanisms in their respective Operating Systems.  
CO2. Implement CPU Scheduling algorithms and demonstrate the necessity of process concurrency and synchronization.  
CO3. Apply optimization techniques in memory management techniques and analyze them.  
CO4. Explain the concepts of input/output, storage and file management.  
CO5. Demonstrate the importance of Protection and handling Deadlock situations.  

UNIT - I  

UNIT - II  
UNIT - III

UNIT - IV

UNIT - V
Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

TEXT BOOK(S)

REFERENCE BOOK(S)
6. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
Prerequisites:
- 20CS21002-OBJECT ORIENTED PROGRAMMING

Course Objectives
Develop ability to
1. Understand the basic web concepts and internet protocols.
2. Acquire knowledge in XML and processing of XML data.
3. Introduce client side scripting with JavaScript and DHTML
4. Understand Server-side programming with Java Servlets and JSP.
5. Implement Server side scripting with PHP.

Course Outcomes (COs)
After Completion of this course Students will be able to
CO1. Create dynamic and interactive web sites.
CO2. Write and execute client side scripts using JavaScript and DHTML.
CO3. Write parse, execute XML schemas.
CO4. Implement, deploy and execute server side programs and components using java servlets and JSPs.
CO5. Implement, deploy and execute server side programs and components using PHP.

UNIT I
HTML: Common Tags- List, Tables, images, forms, frames, types of Cascading Style Sheets. 
Client-side Scripting: Introduction to Javascript, declaring variables, scope of variables, functions, event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

UNIT II
XML: introduction to XML, defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML. Parsing XML Data: DOM and XML parsers in java.

UNIT III
Introduction to Servlets: Common gateway interface (CGI), Lifecycle of a Servlet, Deploying a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions connecting to database using JDBC.

UNIT IV
UNIT V
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control statements, functions, Reading data from web, form controls like text boxes, radio buttons, lists etc. Handling file uploads, connecting to database (Mysql as reference), executing simple queries, handling results, handling sessions and cookies File handling in PHP: file operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

TEXT BOOK(S)
2. The Complete Reference PHP - Steven Holzer, TATA McGraw-Hill

REFERENCES BOOK(S)
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH.
5. Core Servlets and Java Server Pages Volume 1, Core Technologies, Marty Hall and Larry Brown Pearson,
6. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson Education Asia.
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS22005-THEORY OF COMPUTATION
B.Tech. CSE - II Year, II Sem.

Prerequisite(s):
- 20MA11001-BASIC ENGINEERING MATHEMATICS
- 20CS12002-DISCRETE MATHEMATICS

Course Objectives
Develop ability to
1. Understand mathematical methods of computing devices called abstract machines namely finite automata, pushdown automata and turing machines.
2. Explain deterministic and non-deterministic machines.
3. Identify different formal language classes and their relationships.
4. Design grammars and recognizers for different formal languages.
5. Determine the decidability and intractability of computational problems and comprehend the hierarchy of problems arising in computer science.
6. Illustrate all the major phases in process of compilation.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Acquire a fundamental understanding of the core concepts in automata theory and formal languages.
CO2. Design abstract models of computing, including deterministic (DFA), non-deterministic (NFA) finite automata.
CO3. An ability to design grammars and automata (recognizers) for different language classes.
CO4. Design Push down automata for solving computational problems and Turing Machines for arithmetic operations, illustrate various phases of compilation.
CO5. Develop parsers and semantic analyzers without the aid of automatic generators.
CO6. Illustrate techniques for code optimization and object code generation processes.

UNIT - I
Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton (DFA) and non deterministic finite automaton (NFA), transition diagrams and Language recognizers.
Finite Automata: NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

UNIT - II
Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions.
UNIT - III
**Push Down Automata:** Push down automata, definition, model, acceptance of CFL, by final state and by empty stack.

**Turing Machine:** Turing Machine, definition, model, design of TM, counter machine, types of Turing machines (proofs not required).

**Overview of Compilation:** Phases of compilation-lexical analysis, regular grammar and regular expression for common programming language features, Pass and phases of translation, interpretation, bootstrapping, data structures in compilation

UNIT - IV
**Top Down Parsing:** Back Tracking, LL(1), Recursive Descent Parsing, Predictive Parsing, Pre-processing steps required for predictive parsing.

**Bottom Up Parsing:** Shift Reduce Parsing, LR and LALR Parsing, Error Recovery in Parsing, Handling Ambiguous grammar.

**Semantic Analysis:** Intermediate forms of source programs-abstract syntax tree, polish notation and three address codes, conversion of popular programming languages language constructs into intermediate code forms.

UNIT - V
**Code Optimization:** Consideration for optimization, scope of optimization, loop optimization, frequency reduction folding, DAG representation, reduction in strengths.

**Object Code Generation:** Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms.

**TEXT BOOK(S):**

**REFERENCE BOOK(S):**
20CS22L01-DESIGN AND ANALYSIS OF ALGORITHMS LAB
B.Tech. CSE - II Year, II Sem.

Prerequisite(s):
- 20CS11001-PROGRAMMING FOR PROBLEM SOLVING-I LAB
- 20CS21001-DATA STRUCTURES LAB

Course Objectives
Develop ability to
1. Learn the asymptotic notations and understand the performance of algorithms.
2. Learn the behavior of Greedy strategy, Divide and Conquer approach, Dynamic Programming and branch and bound theory and apply them for several problem solving techniques.
3. Explore various data structures and algorithm design methods together impacts the performance of programs.
4. Distinguish between deterministic and non-deterministic algorithms and their computational efficiency.

Course Outcomes (COs)
After completion of the course, student would be able to

CO1. Analyze algorithms and estimate their best-case, worst-case and average-case behaviour in terms of time and space and execute the same through programming.

CO2. Prove the correctness of an algorithm and check whether the algorithm found is the most efficient for solving problems employing trees, graphs and disjoint sets.

CO3. Identify suitable problem solving technique for a given problem and design algorithms using greedy strategy, divide and conquer approach, and dynamic programming and execute the same through programming.

CO4. Identify suitable problem solving technique for a given problem and design algorithms using backtracking, and branch and bound theory and execute the same through programming.

CO5. Design deterministic and non-deterministic algorithms for tractable and intractable problems and categorize them as P Class/ NP Class/ NP-Hard/ NP-complete problems accordingly.

LIST OF LAB EXERCISES (R20)
1. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

2. Write and implement an algorithm determining articulation points and the bi-connected components in the given graph.

3. Implement an algorithm to find the minimum cost spanning tree using
   a) Prim’s algorithm
   b) Kruskal’s Algorithm
4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra’s algorithm.

5. Implement Job Sequencing with Deadlines algorithm and Fast Job Sequencing with Deadlines.

6. Implement Matrix Chain multiplication algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.

7. Implement 0/1 Knapsack problem using Dynamic Programming.

8. Implement an algorithm to find the optimal binary search tree for the given list of identifiers.

9. Find a subset of a given set \( S = \{s_1, s_2, \ldots, s_n\} \) of \( n \) positive integers whose Sum is equal to a given positive integer \( d \). For example, if \( S = \{1, 2, 5, 6, 8\} \) and \( d = 9 \) there are two solutions \( \{1, 2, 6\} \) and \( \{1, 8\} \). A suitable message is to be displayed if the given problem instance doesn't have a solution.

10. Implement n-Queens problem using Back Tracking.

11. Write a program for Hamiltonian Cycle Problem.

12. Implement the solution for TSP problem using Branch & Bound technique.
Course Objectives
Develop ability to
1. Understand main components of Operating System (OS) and their working.
2. Implement the different CPU scheduling policies, and process synchronization.
3. Apply the different memory management techniques.
4. Understand File management techniques.
5. Handling Deadlock situations and provide system protection.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Compare synchronous and asynchronous communication mechanisms in their respective Operating Systems.
CO2. Implement CPU Scheduling algorithms and demonstrate the necessity of process concurrency and synchronization.
CO3. Apply optimization techniques in memory management techniques and analyze them.
CO4. Explain the concepts of input/output, storage and file management.
CO5. Demonstrate the importance of Protection and handling Deadlock situations.

List of Experiments:

Week 1: Simulate the following CPU scheduling algorithms
a. First Come First Serve (FCFS)
b. Shortest Job First (SJF)
c. Priority
d. Round Robin

Week 2:
a. Simulate Multiprogramming with Variable number of Tasks (MVT)
b. Simulate Multiprogramming with Fixed number of Tasks (MFT)

Week 3: Simulate all page replacement algorithms
a. First In First Out (FIFO)
b. Optimal
c. Least Recently Used (LRU)

Week 4: Simulate all File Organization Techniques
a. Single level directory
b. Two level directory
c. Hierarchical directory
**Week 5:** Simulate all File allocation strategies  
   a. Sequential  
   b. Indexed  
   c. Linked  

**Week 6:** Simulate Bankers Algorithm for Dead Lock Avoidance  

**Assembly Language Programming Lab**

**Course Objectives:**  
1. To introduce principles of computer organization and the basic architectural concepts.  
2. Recommend instruction formats, addressing modes, micro instructions for design of control unit  
3. Write assembly level programs using 8086 microprocessor.  
4. Understand the I/O and memory organizations of a Computer system  
5. Recognize different parallel processing architectures  

**Course Outcomes:**  
CO1. Demonstrate an understanding of the design of the functional units of a digital computer system.  
CO2. Design micro instructions for different kinds of CPU organizations with proper understanding of instruction formats and addressing modes  
CO3. Write assembly language programs using 8086 microprocessor with the knowledge of pin diagram, registers and instruction formats of 8086 microprocessor.  
CO4. Identify different hardware components associated with the memory and I/O organization of a computer  
CO5. Differentiate different parallel processing architectures  

**Week 1:**  
   a. Architecture of 8086 microprocessor  
   b. Instruction Set of 8086 microprocessor  

**Week 2:**  
   a. Write a program to display string "Computer Science and Engineering".  
   b. Write an Assembly Language Program (ALP) to display multiple strings line by line.  
   c. Write an Assembly Language Program (ALP) to find the maximum of three numbers.  

**Week 3:**  
   a. Write an Assembly Language Program (ALP) to print numbers from 0 to 9  
   b. Write an Assembly Language Program (ALP) to check whether a given number is even or odd.  

**Week 4:**  
   a. Write an Assembly Language Program (ALP) to find the factorial of a number.  
   b. Write an Assembly Language Program (ALP) to print fibo series up to 5 numbers.  

**Week 5:**  
   a. Write an Assembly Language Program (ALP) to take n values from user and calculate their sum.(BL contains the result)  
   b. Write an Assembly Language Program (ALP) to take n values from user and calculate maximum and minimum values
Week 6:
   a. Write 8086 Assembly Language Program (ALP) to transfer a block of data from one location to another.
   b. Write an Assembly Language Program (ALP) to reverse the given string.
   c. Write an Assembly Language Program (ALP) to perform addition of two 2X2 matrices.

Week 7:
   a. Write an Assembly Language Program (ALP) for linear search.
   b. Write an Assembly Language Program (ALP) to take n values from user and sort them in ascending order.
20CS22L03-WEB TECHNOLOGIES LAB

B.Tech. CSE - II Year, II Sem.

Prerequisite(s):
- 20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I LAB
- 20CS21L02-OBJECT ORIENTED PROGRAMMING LAB
- 20CS21L03-DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives
Develop ability to
1. Understand the basic web concepts and internet protocols.
2. Acquire knowledge in XML and processing of XML data.
3. Introduce client side scripting with JavaScript and DHTML
4. Understand Server-side programming with Java Servlets and JSP.
5. Implement Server side scripting with PHP.

Course Outcomes (COs)
After Completion of this course Students will be able to
CO1. Create dynamic and interactive web sites.
CO2. Write and execute client side scripts using JavaScript and DHTML.
CO3. Write parse, execute XML schemas.
CO4. Implement, deploy and execute server side programs and components using java servlets and JSPs.
CO5. Implement, deploy and execute server side programs and components using PHP.

LIST OF LAB EXERCISES

Week 1
Write a HTML page including any required java script that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. if the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

Week 2
Write a HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.

Week 3
Write a HTML page that contains a selection box with a list of 5 countries. When user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of capital (color, bold, and font size).
Week 4
Write a XML file which will display the Book information which includes the following:
Title of the book, Author Name, ISBN number, Publisher name, Edition, Price
i. Write a Document Type Definition (DTD) to validate the above XML file.
ii. Write a XSD to validate the above XML file.

Week 5
Create a XML document that contains 10 users information. Write a java Program, which takes User Id as input and returns the user details by taking the user information from XML document using (a) DOM Parser and (b) SAX parser.

Week 6
a. Write a Servlet for User validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
b. Modify the above Program to an xml file instead of database.

Week 7
a. Write a Servlet for a simple calculator web application that takes two numbers and an operator (+,-,*,%) from an HTML page and returns the result page with the operation performed on the operands.
b. Write a Servlet for web application that lists all cookies stored in the browser on clicking “List Cookies” button. Assume cookies if necessary.

Week 8
a. Write JSP for User validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
b. Write JSP for a simple calculator web application that takes two numbers and an operator (+,-,*,%) from an HTML page and returns the result page with the operation performed on the operands.

Week 9
a. Write JSP for a web application that lists all cookies stored in the browser on clicking “List Cookies” button. Assume cookies if necessary.
b. Write JSP for a web application that takes name and age from an HTML page. If the age is less than 18, it should be send a page with “Hello <name >, you are not authorized to visit this site” message, where < name> should be replaced with the entered name. Otherwise it should send “Welcome <name> to this site” message.

Week 10
a. Write PHP code for user validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
b. Write PHP code for a simple calculator web application that takes two numbers and an operator (+,-,*,%) from an HTML page and returns the result page with the operation performed on the operands.
Week 11
Write PHP Code Validate the following fields of registration page.
   i. Name (it should contain alphabets and length at least 6 characters)
   ii. Password (it should not be less than 6 characters)
   iii. Email id (it should not contain any invalid character must follow the standard pattern name@domain.com)
   iv. Phone number (it should contain 10 digits only)

Week 12
A web application for implementation using PHP. The user is first served login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions
   If name and password match serves a welcome page with user’s full name
   If name matches and password doesn’t match, then server “password mismatch” page
   If name is not found in the full name, it stores the login name, password and full name in the database.(hint: Use session for storing the submitted login name and password)
Course Objectives
Students Develop ability to
1. Understand the importance of vocabulary to be used in different situations.
2. Read, comprehend the passages, summarize and paraphrase information in a text.
3. Communicate effectively in different socio cultural contexts with proper articulation.
4. Write precisely.

Course Outcomes (COs)
At the end of the course, students would be able to
CO1. Synergize the acquired skills to improve employability prospects by acquiring relevant vocabulary
CO2. Making inferences and predictions based on comprehension of a text.
CO3. Using effective conveying strategies and develop effective Presentation Skills.
CO4. Producing well organized essays and use a variety of accurate sentence structures.

MODULE-I
Must have words/Word power
Vocabulary: Collocations: noun and noun, noun and verb, noun and adverb, noun and adjective, prepositional phrases-connotative words.

MODULE-II
Cognitive Reading
Reading: Reading comprehension: rapid reading (vertical reading), meta-cognition, cloze tests, paragraph jumbles.

MODULE-III
Advanced Articulation

MODULE-IV
Essentials of composition
Writing: Picture interpretation: analyzing and expressing in either oral or written form. Sentences out of context, summarizing, Essay (Analytical, argumentative and exploratory) writing practice.
Classroom Activity based Course. Hence, Lab. is not required.

TEXT BOOK(S)
REFERENCE BOOK(S)
1. Inc. Bar Charts, English Composition & Style, Inc. Bar Charts, 2009-11-30
Prerequisite(s): None.

Course Objectives
1. To familiarize students with design thinking concepts and principles
2. To ensure students can practices the methods, processes and tools of design thinking.
3. To ensure students can apply the design thinking approach and have ability to model real world situations.
4. To enable students to analyze primary and secondary research in the introduction to design thinking

Course Outcomes (COs)
CO1. Examine Design Thinking concepts and principles
CO2. Practice the methods, processes, and tools of Design Thinking
CO3. Apply the Design Thinking approach and model to real world situations
CO4. Analyze the role of primary and secondary research in the discovery stage of Design Thinking

MODULE-I: Introduction to Design Thinking, Business Model Innovation, Challenges Best-Suited for Design Thinking, Visualization Tool, Product Life Cycle - Design Ethics


MODULE-IV: The Physics of Innovation, The IBM model of design thinking, Learning Launch Tool, Strategic Opportunities, Identifying customer needs- Empathic design, Customer needs and markets analysis tools, Translating customer needs into measurable specifications, Case-studies

MODULE-V
The macro framework- Commercial assessment tools, Integral and modular approaches to design, Design for environment theories, Sustained and maintained innovation – creating systemic innovation culture and principles

TEXT BOOK(S)
REFERENCE BOOK(S)

3. The field guide to human centered design by Design Kit.
Prerequisite(s): None

Course Objectives
Develop ability to
1. Understand the basis of software development process.
2. Design the requirements of the customer.
3. Elaborate the design process of software development.
4. Identify various project and process metrics.
5. Apply software testing and its importance in assuring quality.

Course Outcomes (COs)
At the end of this course, student would be able to
CO1. Identify various software process models and its techniques.
CO2. Analyze the requirements and specifications of the project.
CO3. Design software architecture & its process.
CO4. Evaluate the project using process and project metrics.
CO5. Confirm the quality of the software through testing.

UNIT-I
Introduction

UNIT-II
Requirements Analysis
Requirements engineering tasks – Eliciting requirements-Building an analysis model-functional and non functional requirements analysis –Analysis modeling approaches-Data modeling concepts-Flow oriented modeling-class based modeling.

UNIT-III
Software Design
Design concepts – Design model - Software architecture - Architectural design –mapping data flow in to software architecture – Modeling component level design – performing user interface design – Golden rules of user interface – Interface design steps.

UNIT-IV
Managing the Software Projects
UNIT-V
Software Testing and Quality
Strategic issues – Software testing fundamentals – Levels of testing – Art of debugging-
Black and White box testing and their techniques – Basis path testing – Control Structures
testing – OO testing–SQA-Quality metrics-Software Reliability-Software reliability–Quality
models-Software maintenance-CASE tools.

TEXT BOOK(S)


REFERENCE BOOK(S)

2. Software Engineering, an Engineering approach-James F Peters, Witeld Pedryez, John
Wiely, 1999.
Course Objectives
Develop ability to
1. Develop a modern network architectures from a design and performance perspective.
2. Understand the protocols of data link layer and MAC sub layer.
3. Distinguish and explain different network layer protocols and routing algorithms.
4. Describe the functions of TCP and UDP protocols.
5. Illustrate the application layer protocols such as HTTP, FTP, SMTP, DNS and TELNET.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Identify the different types of network topologies, protocols and understand the layers of the OSI and TCP/IP model. Understand the different protocols in Datalink.
CO2. Have a basic knowledge of the use of Datalink layer protocols.
CO3. Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
CO4. Analyze the Datagrams in the Internet using Network Tools.
CO5. Have a working knowledge of Application layer protocols.

UNIT-I

UNIT-II
Data Link Layer: Design Issues, Services provided to Network Layer, Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking. Medium Access Control Sub Layer: Random Access, Multiple Access protocols-Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT-III
UNIT-IV

UNIT-V
Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

TEXT BOOK(S)


REFERENCE BOOK(S)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS31003-ARTIFICIAL INTELLIGENCE
B.Tech. CSE - III Year, I Sem.

Prerequisite(s):
20CS21001- DATA STRUCTURES
20CS12002- DISCRETE MATHEMATICS

Course Objectives
Develop ability to

1. Understand the difference between various intelligent agents and environments including solving problems by searching the solution space.
2. Understand adversarial search and propositional logic to find the solutions of constraint satisfaction problems
3. Inference using first order logic and describe knowledge representation
4. Design solutions to a problem in the real world environment.
5. Learn to infer in uncertain domains using probabilistic learning models

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Differentiate various intelligent agents and environments. Also solve problems by searching the solution space.
CO2. Use adversarial search and propositional logic to solve constraint satisfaction problems
CO3. Use first order logic to infer and describe knowledge representation
CO4. Plan solutions for problems in the real world environment.
CO5. Infer in uncertain domains using probabilistic learning models

UNIT - I
Problem Solving by Search-I & II

UNIT - II
Adversarial Search:
Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.
Constraint Satisfaction Problems:
Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.
Propositional Logic:
Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III
Logic and Knowledge Representation
First-Order Logic:
Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic:
Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation:
Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT - IV
Planning
Classical Planning:

Planning and Acting in the Real World:
Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning,

UNIT - V
Uncertain knowledge and Learning
Uncertainty:
Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes’ Rule and Its Use,

Probabilistic Reasoning:
Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning: Dempster-Shafer theory.

Learning:
Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.
TEXTBOOK(S)


REFERENCE BOOK(S)

B.Tech CSE

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CE31061-BUILDING TECHNOLOGY
(OPEN ELECTIVE – I)

B.Tech. CSE - III Year, I Sem.

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Know the various materials used in the buildings.
2. Understand the building by-laws and ventilation required in the buildings.
3. Estimate the repairs and transportation systems required in buildings.
4. Know the prefabrication and Air condition requirements.
5. Know the plumbing systems required in building.

Course Outcomes (COs)
At the end of the course, student would be able to
CO 1: Explain characteristics of building materials.
CO 2: Describe the building Bye laws and plan the building.
CO 3: Estimate the repairs in building and types of transportation in building.
CO 4: Assess the prefabrication systems and air conditioning required in buildings.
CO 5: Explain principles of acoustics in building and plumbing.

UNIT – I
Bricks: Characteristics of good building bricks. Types of bricks and their significance.

UNIT – II
Building: Basic definitions, Types, components, economy and design, principles of planning of buildings and their importance, building bye-laws.
Ventilation: Definitions and importance of circulation; Lighting and ventilation; how to consider these aspects during planning of building.

UNIT – III
Repairs in Buildings: Inspection, control measures and precautions for various construction defects, General principles of design of openings, and various types of fire protection measures to be considered while planning a building.
Vertical transportation in buildings: Types of vertical transportation, Stairs, different forms of stairs, planning of stair cases, other modes of vertical transportation – lifts, ramps, escalators.

UNIT – IV
Prefabrication systems: Prefabrication systems in residential buildings – walls, openings, cupboards, shelves, etc., planning and modules and sizes of components in prefabrication.

UNIT – V

Plumbing services: Water supply system, maintenance of building pipe line, Sanitary fittings, principles governing design of building drainage.

TEXT BOOK(S)


REFERENCE BOOK(S)

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand the fundamental concepts of accident prevention with a basic knowledge of safe work rules designed to promote an accident free workplace.
2. Understand the relief systems.
3. Understand the electrical hazards and safety handling of equipment.
4. Understand the effects of momentum and buoyancy.
5. Gain knowledge from different case studies.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Determine responsibility for safety in the workplace.
CO2. Recognize workplace hazards.
CO3. Learn procedures to eliminate or lessen those hazards.
CO4. Apply basic Federal and State Safety Rules to the workplace.

UNIT-I

UNIT-II
Relief systems: Preventive and protective management from fires and explosion-inerting, static electricity passivation, ventilation, and sprinkling, proofing, relief systems –relief valves, flares, scrubbers.

UNIT-III
UNIT – IV
Leaks and leakages: Spill and leakage of liquids, vapours, gases and their mixture from storage tanks and equipment; Estimation of leakage/spill rate through hole, pipes and vessel burst; Isothermal and adiabatic flows of gases, spillage and leakage of flashing liquids, pool evaporation and boiling; Release of toxics and dispersion. Naturally buoyant and dense gas dispersion models; Effects of momentum and buoyancy; Mitigation measures for leaks and releases.

UNIT-V
Case studies: Flixborough, Bhopal, Texas, ONGC offshore, HPCL Vizag and Jaipur IOC oil-storage depot incident; Oil, natural gas, chlorine and ammonia storage and transportation hazards.

TEXT BOOK(S)

REFERENCE BOOK(S)
3. Indian Electricity Act and Rules, Government of India.
GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20ME31063– NANO MATERIALS AND TECHNOLOGY  
(OPEN ELECTIVE - I)  

B.Tech. CSE - III Year, I Sem.  

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Expose the students to a highly interdisciplinary subject
2. Enable the students to understand the basic concepts of Nanotechnology
3. Enhance the knowledge of students in nanomaterials, properties and their applications

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Identify nano materials by their superior characteristics
CO2. Demonstrate synthesis of zero dimensional nano structured materials.
CO3. Illustrate conducive methods to synthesize one dimensional nano structures
CO4. Compare and comprehend methods to produce two dimensional nano structures.
CO5. Comprehend synthesis of thin films and special nano materials

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
UNIT-V
Thin Films: Atomic layer deposition (ALD), Electro-chemical deposition (ECD), Sol-Gel films.

TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. It provides an understanding of various measuring systems functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO2. Measure various physical parameters by appropriately selecting the transducers.
CO3. Use various types of signal generators, signal analyzers for generating and analyzing various realtime signals.

UNIT-I

UNIT-II
Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

UNIT-III

UNIT-IV
Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.
UNIT-V

**Transducers:** Classification, Strain Gauges, Bounded, unbounded; Force and Displacement
Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples,
Synchros, Special Resistance Thermometers, Digital Temperature sensing system,
Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand the various concepts, importance and types of intellectual property rights.
2. Discuss the purpose of trademarks.
3. Analyze the fundamental laws of copy rights and patents.
4. Understand trade secret laws, trade secret litigation and unfair completion.
5. Understand the latest developments in IPR.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Acquire knowledge on intellectual property rights
CO2. Track the regulation process of trademark. Discuss the functions of trademark.
CO3. Identify the importance of copyrights, patents searching process and transfer of Ownership
CO4. Know about secret laws, unfair competition, false advertising.
CO5. Reciprocate to new developments of intellectual property rights.

UNIT-I
Introduction to Intellectual property: Concepts, types of intellectual property, international organizations, agencies and treaties, and importance of intellectual property rights.

UNIT-II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III
Law of Copy Rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right laws.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT-IV
Trade Secrets: Trade secrete law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition- misappropriation right of publicity, false advertising.

UNIT-V
Latest development of intellectual property Rights: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual
property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOK(S)

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.

REFERENCE BOOK(S)

Prerequisite(s): None

Course Objectives
Develop ability to
1. Understand the basis of software development process.
2. Design the requirements of the customer.
3. Elaborate the design process of software development.
4. Identify various project and process metrics.
5. Apply software testing and its importance in assuring quality.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Identify various software process models and its techniques.
CO2. Analyze the requirements and specifications of the project.
CO3. Design software architecture & its process.
CO4. Evaluate the project using process and project metrics.
CO5. Confirm the quality of the software through testing.

1. For a given a problem statement, analyze using any one of the software process models of your choice.

ATM SYSTEM CASE STUDY The ATM System is the project which is used to access their bank accounts in order to make cash withdrawals. Whenever the user needs to make cash withdrawals, they can enter their PIN number (personal identification number) and it will display the amount to be withdrawn in the form of 100s, 500s, and 1000s. Once their withdrawal was successful, the amount will be debited in their account. The ATM System project will be developing in VB.Net and backend database as Microsoft-Access. VB.Net is the one of the powerful versions of Framework and object oriented programming. Hence we use this software in our project.

The ATM will service one customer at a time. A customer is required to enter ATM Card number, personal identification number (PIN) – both of which will be sent to the database for validation as part of each transaction. The customer will then be able to perform one or more transactions. Also customer must be able to make a balance inquiry of any account linked to the card. The ATM will communicate each transaction to the database and obtain verification that it was allowed by the database. In the case of a cash withdrawal, a second message will be sent after the transaction has been physically completed (cash dispensed or envelope accepted). If the database determines that the customer’s PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed.
If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful transaction, showing the date, time, machine location, type of transaction, account(s), amount, and ending and available balance(s) of the affected account (“to” account for transfers).

Adopt the following software development strategy

- Water fall model
- Iterative model
- Rapid-prototyping model
- Spiral model
- Unified Process
- Software documentation Standard to follow: IEEE standard or DOD-2167A

Milestones in the project:

1. **Problem Analysis and Project Planning**
   Thorough study of the problem – Identify project scope, Objectives, infrastructure, and plan for the project; Document it.

2. **Software Requirement**
   Analysis describes the individual Phases/ modules of the project, Identify deliverables; Document it

3. **Data Modeling**
   Use work products – use case diagram, data flow diagram, Flow chart

4. **Software Development and Debugging**
   Choose programming language of your choice

5. **Software Testing**
   Prepare test plan, perform validation testing, coverage analysis, test case prioritization.

**NOTE:**

- Each student can adopt different software development life cycle (such as Water fall model, iterative model, spiral model, RAD, prototyping model etc…) and programming language combination so that each student work in unique but still conform to over all deliverable.
- Teams to be formed containing 5 in each to make the software engineering activities effectively with good coordination.
- Any other systems like(Library Management system, hospital management system, course registration system, railway reservation system) can also be done.
- If the problem statement is not mentioned explicitly, first the problem statement can be written, then follow the same flow.
Prerequisite(s):
20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I LAB
20CS21L02-OBJECT ORIENTED PROGRAMMING LAB

Course Objectives
Develop ability to
1. Develop an understanding of modern network architectures from a design and performance perspective.
2. Understand the protocols of data link layer and MAC sub layer and apply different techniques of error detection and error correction.
3. Distinguish and explain different network layer protocols and routing algorithms.
4. Describe the functions of TCP and UDP protocols.
5. Illustrate the application layer protocols such as HTTP, FTP, SMTP, DNS and TELNET.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Identify the different types of network topologies, protocols and explain the layers of the OSI and TCP/IP model.
CO2. Design a wide area networks (WANs), local area networks (LANs) and wireless LANs (WLANs) for a given requirement (small scale) based on the market available components and describe the protocols of data link layer and MAC Sub layer.
CO3. Classify and compare the major routing protocols and congestion control algorithms.
CO4. Develop a program for a given problem related to TCP/IP and UDP protocols using network programming.
CO5. Analyze the application layer protocols using open source available software and tools.

List of Experiments

Week-1
Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using Crimping tool.

Week-2
Connect the computers in LAN, Study of basic network commands and network configuration commands.

Week-3
Study of Network simulator tool and implement IP Address configuration in Network simulator tool.
Week-4
Configure different network topologies using Packet Tracer/Network Simulator tool.

Week-5
  a. Write a program to implement the Data link layer framing methods character stuffing and bit stuffing.
  b. Write a program to simulate Stop and Wait Protocol and Sliding Window Protocols.

Week-6
Write a program to implement on a data set of characters using the Cyclic Redundancy Check.

Week-7
Write a program to simulate Carrier Sense Multiple Access/Collision Detection (CSMA/CD) and Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA).

Week-8
Configure a network using Distance Vector Routing protocol using packet tracer tool.

Week-9
Write a program to implement Client - Server communication for chat using Transmission Control Protocol (TCP).

Week-10
Configure FTP Server on a Linux/Windows machine using a FTP client. Use a TFTP client and repeat the experiment.

Week-11
Install Telnet on one of the systems connected by a switch and telnet to it from the other system. Using Wireshark tool, capture the packets and analyze the TCP 3-way Handshake for connection establishment and tear down.

Week-12
Using RSA Algorithm encrypt a text data and decrypt the same.

Software’s used:
  - C/ Java/ Equivalent compiler
  - Network Simulator like NS2/NS3/CISCO Packet tracer tool/Wireshark tool
B.Tech. CSE - III Year, I Sem.

Prerequisite(s): None

Course Objectives
Develop ability to
1. Learn the difference between optimal reasoning and human like reasoning.
2. Know about basic concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
3. Obtain a thorough knowledge of various knowledge representation techniques.
4. Study about various reasoning techniques.
5. Know about various applications of AI, namely game playing

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Formulate an efficient problem space for a given problem.
CO2. Identify a suitable search algorithm to search the solution of a problem in view of its characteristics namely time and space complexities.
CO3. Represent the knowledge of the given problem domain using rules and appropriate knowledge representation technique.
CO4. Exploring AI techniques for solving problems with Reasoning and Uncertain models.
CO5. Possess the skill to apply AI techniques to solve problems of Game playing.

List of Experiments

Week-1
a. Write a python program to print the multiplication table for the given number?
b. Write a python program to check whether the given number is prime or not?
c. Write a python program to find factorial of the given number?

Week-2
a. Write a python program to demonstrate the usage of List operations. (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing, Add, Append, Extend & Delete)
b. Write a Python Program to Remove Duplicate Element from a List.

Week-3
Write a python program to implement Water Jug Problem?

Week-4
Write a python program to implement Breadth-first search and Depth-first search
Week-5
Write a Python code to implement 8-puzzle Problem.

Week-6
Write a python program to implement Tic-Tac-Toe game.

Week-7
(a)Write a python program to implement constraint satisfaction problem.

Week-8
Write a python program to implement Greedy best-first search.

Week-9
Write a Python code to implement alpha–beta pruning.

Week-10
Write a python program to construct a Bayesian network by considering any example data.

Week-11
Write a Python program to implement A* search.

Week-12
Write a Python code to solve traveling salesman problem.
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(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20EN31L01- PROFESSIONAL COMMUNICATION SKILLS LAB (PCS LAB)
B.Tech. CSE - III Year, I Sem.

Prerequisite(s): None

Course Objectives
Develop ability to
1. Acquire behavioral skills required for their personal and professional life.
2. Help students develop their leadership skills.
3. Read and comprehend texts and respond appropriately in different Socio-Cultural contexts.
4. Communicate their ideas effectively orally and in written form.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Demonstrate effective Listening and Speaking Skills.
CO2. Develop proficiency in academic reading and writing.
CO3. Cultivate employability skills thereby increasing Job prospects.
CO4. Communicate confidently for all official purposes.

Module-I
Activities on Fundamentals of Inter-Personal Communication: Responding appropriately and relevantly using the right body language, discourse skills. Resilience and Personal Management-Managing stress, time, anger and other emotions, assertiveness and culture shock.

Module-II
Activities on Reading Skills: Reading for facts, reading for specific information, reading between the lines, negative facts, inferential reading, critical reading.

Module-III
Activities on Writing Skills: Writing process, gather information, analyzing the content, formatting, editing, Resume writing and CV preparation, writing SOP, letter writing and email writing and Video Resume or Visume’.

Module-IV
Activities on Presentation Skills: Oral Presentations (individual & group), seminars, ppts and written presentations through posters, projects, portfolio building or management, brochures and reports.

Module-V
Activities on Group Discussion and Interview Skills: Dynamics of Group Discussion-Videos of MockGDs-intervention, summarizing, body language, relevance and organization of ideas and rubrics for evaluation.Threestagesof Interviews-pre,during and postinterview planning, opening strategies, answering strategies, interview through Tele-Conference and
Video Conference and Mock Interviews, Videos of Mock Interviews, H.R questions, SJT questions.

TEXT BOOK(S)

1. PCS Lab Manual prepared by the Faculty of English, Freshman Engineering Department.

REFERENCE BOOK(S)

Course Objectives

1. Distinguish between simple and compound interest and demonstrate how to determine each; Evaluate profit/loss for the given various price related problems; Understand the importance of percentage, ratio and proportions while solve the problems in different scenarios.
2. Evaluate the average by various methods; Understand the concepts of speed, distance and time, solve the related problems; Understand the concepts of work done in a given period of time in various contexts.
3. Understand the statements and their connectives; Identify the validity of conclusions drawn from the given statements and identify strong/weak arguments from a given statement; Determine various Analogies to identify the similarities of the objects.
4. Understand the various concepts of Non Verbal reasoning; Create awareness on blood relations and solve the related problems; Understand the concepts of binary logic and solve the analytical problems.

Course Outcomes (COs)

At the end of the course, student would be able to:

CO1. Analyze the difference between simple and compound interest and solve various related problems; Analyze the factors that influence the level of profit/loss for the given problem; Evaluate percentages of different quantities and apply ratios and proportions to solve real-life problems.

CO2. Apply the various types of averages to analyze the feature of the given data; Apply various principles to solve problems on time and distance; Analyze the time period of work done problems.

CO3. Derive the logical connectives for the given simple and compound statements; Interpret the validity of conclusions drawn from the given statements and determine strong/weak arguments from a given statement; Deduce the similarities of the objectives for various analogies.

CO4. Use critical thinking and logic to solve problems on Non Verbal reasoning; Construct a family tree based on the given information and solve blood relation problems; Solve analytical puzzles using binary logic.

Quantitative Aptitude:

1. Simple Interest: Definitions, Problems on interest and amount, Problems when rate of interest and time period are numerically equal. Compound Interest: Definition and formula for amount in compound interest, Difference between simple interest and compound interest for 2 years on the same principle and time period.
2. **Profit & Loss:** Cost price, selling price, marked/list price, profit/gain, discount, use of false scale for selling an article, discount series and net selling price, successive Selling.

3. **Percentages, Ratio & Proportions:**
   Calculating a percentage, calculating increase or decrease, calculating percent change, calculating successive percentages, definition of ratio and proportions, direct proportion, Inverse or reciprocal proportion, continued proportion, Mean proportion, Third proportion, Fourth proportion, compound ratio.

4. **Averages:** Definition of Average, Rules of Average, Problems on Average, Problems on Weighted Average, Finding average using assumed mean method.

5. **Time and Distance:** Relation between speed, distance and time, converting km/h into m/s and vice versa, Problems on average speed, Problems on relative speed, Problems on trains.

6. **Time and Work:** Problems on Unitary method, Relation between Men, Days, Hours and Work, Problems on Man-Day-Hours method, Problems on alternate days, Problems on Pipes and Cisterns.

**Logical Reasoning:**

7. **Logical Connectives:** Definition of simple statement, Definition of compound statement, finding the implications for compound statements, finding the negations for compound statements.

8. **Syllogism:** Definition of statement/premises and conclusion, explanation through Venn diagram, problems on two/three statements and one/two conclusions, identification of statements and conclusions from the given set of statements. **Statements and Arguments:** Types of arguments, Strong argument, weak argument, identifying strong/weak arguments from a given statement.

9. **Analogy Classifications:** Definition of Analogy, Problems on number analogy, Problems on letter analogy, Problems on verbal analogy.

10. **Non Verbal Reasoning:** Identification of continued figure or odd figure by using analogy, series, rotation in clockwise and rotation in anticlockwise, vertical, horizontal, alternative rotation, addition, subtraction.

11. **Blood Relations:** Blood relations on Family Tree concepts (relationships in the family), paternal side relations, maternal side relations, simple and direct relationships, relation puzzles, coded relations.

12. **Binary Logic:** Definition of a truth-teller, Definition of a liar, Definition of an alternator, solving problems using method of assumptions, solving analytical puzzles using binary logic.
TEXT BOOK(S)


REFERENCE BOOK(S)

Prerequisite(s): None

Course Objectives
Develop ability to
1. To familiarize various types of Cyber Security concepts, cyber-attacks and cyber-crimes.
2. To give an overview of the cyber laws, National Cyber Security Policy, Forensics Investigation.
3. To study the defensive techniques against Mobile and Wireless attacks.
4. To learn about Cyber security and Cyber terrorism.
5. To familiarize various Basic Data Privacy Concepts.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Classify information security aspects, namely, security attacks, services and mechanisms.
CO3. Know about crime that involves a computer and a network.
CO4. How to protect oneself and the entire Internet community from Cyber attacks.
CO5. Analyze how data is shared with third parties.

UNIT-I

UNIT-II

UNIT-III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing

**UNIT-IV**

**Cyber Security**: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

**Cybercrime and Cyber terrorism**: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

**UNIT-V**

**Privacy Issues**: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

**Cybercrime**: Examples and Mini-Cases: Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

**Mini-Cases**: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**

B.Tech CSE

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32001-INTERNET OF THINGS
B.Tech. CSE - III Year, II Sem.

Prerequisite(s):
20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I
20CS31002-COMPUTER NETWORKS

Course Objectives
Develop ability to
1. Assess the vision and introduction of IoT and understanding how M2M is connected to internet of things
2. Identify the appropriate Hardware and software components of IoT for communication
3. Gain knowledge on Cloud Storage models, web servers and how to integrate device, data and cloud management framework for IoT.
4. Learn the concepts of various data analytics and operational technology security with IoT.
5. Understand advanced and emerging concepts fog computing and Edge computing-IoT

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Interpret the vision of IoT from a global context, compare and contrast M2M and IoT Technology
CO2. Relate the appropriate Hardware and software components of IoT for providing the communication among the devices
CO3. Implement device, data and cloud management services for IoT applications.
CO4. Explore various data analytical techniques and operational security for IoT applications.
CO5. Comprehend the need of Fog Computing and Edge Computing-IoT

UNIT-I
Introduction to Internet of Things: Definition and Characteristics of IoT, Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT-II
Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.
Software Components: Programming API’s (using Python/ Node.js/ Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT-III
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT
**IoT Application Development**: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices

**UNIT-IV**
**Data and Analytics for IoT**: Introduction to Big Data Analytical Tools for IoT, Data Analytics for IoT, Edge Streaming Analytics, Network Analytics, Machine Learning for IoT

**Securing IoT**: Introduction to OT (Operational Technology) security, a brief history and common challenges in OT (Operational Technology) Security,

**UNIT-V**

**TEXT BOOK(S)**


**REFERENCES BOOK(S)**

Course Objectives
Develop ability to
1. Understand different types of random variables and their distributions.
2. Estimate the minimum proportion of observations that fall within a specified values; Solve counting problems using generating functions.
3. Estimate the population parameter from a sample and identify the different types of Testing of hypothesis.
4. Classify the linear and logistic regression.
5. Observe the closest point of the lines from both the classes. Learn the concept of PCA.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Distinguish between random variables pertaining to discrete/ continuous distribution systems and apply the discrete distributions like Binomial and Poisson and continuous distribution like Normal and their properties.
CO2. Calculate the minimum proportion of observations that fall within a specified values Analyze probability distribution functions.
CO3. Interpret the result of a test of hypothesis in the context of small and large samples.
CO4. Apply linear and logistic regression to estimate and analyze the association between dependent and independent variable.
CO5. Maximize the margin. Reduces the linear dimensionality and improves the feature extraction.

UNIT-I
Basics of Probability Theory, Baye’s Theorem; Random Variables (Discrete and Continuous); Probability Distribution of RV, Expectation, Variance (Binomial, Poisson, Uniform, Normal and Exponential).

Unit-II
Chebyshev’s and Markov inequalities, Law of Large Numbers and Central Limit Theorem.
Data simulations in parametric setup: Random number generation (a) Discrete RVs (Binomial, Poisson and Uniform) (b) Continuous RVs (Normal and Exponential). Acceptance/Rejection algorithm.

UNIT-III
Parameter Estimation: Estimation of Model Parameters (Maximum Likelihood Estimation and Method of Moments), Confidence Interval (CI) Estimation, Bayesian Estimation and CI.
UNIT-IV
**Linear/Non-linear models:** Multiple Linear Regression: Multiple Regression Models, Hypothesis Test for Significance of regressors, Logistic Regression: Models with a Binary Response Variable, Estimating the Parameters in a Logistic Regression Model, Interpretation of the Parameters in a Logistic Regression Model; Classification and Density Estimation.

UNIT-V
Classification (SVM), Clustering (K-means) and Dimension Reduction (PCA).
**Kernel Methods:** Mercer’s Kernels, Kernel Classification, Kernel PCA.

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**

3. An Introduction to Statistical Learning with Applications in R by James, G., Witten, D., Hastie, T., Tibshirani, R. Springer 2013.
B.Tech CSE

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32009-INFORMATION RETRIEVAL SYSTEMS
(PROFESSIONAL ELECTIVE I)

B.Tech. CSE - III Year, II Sem.

Prerequisite(s):
20CS21001-DATA STRUCTURES

Course Objectives
Develop ability to
1. Study the different models for information storage and retrieval.
2. Learn about the various retrieval utilities.
3. Understand indexing and querying in information retrieval systems.
4. Interpret the various notions of structured and semi structured data.
5. Learn about web search and its retrieval methods.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Design Information Retrieval system and its capabilities.
CO2. Organize different documents using cataloging and indexing algorithms.
CO3. Use the various indexing techniques to perform document retrieval.
CO4. Rank user search using relevance feedback methods.
CO5. Develop a multimedia Information Retrieval System for web document.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
UNIT V

TEXT BOOK(S)


REFERENCE BOOK(S)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(UGC Autonomous)  
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32010-DESIGN PATTERNS  
(PROFESSIONAL ELECTIVE I)

B.Tech. CSE - III Year, II Sem.

Prerequisite(s):
20CS31001-SOFTWARE ENGINEERING  
20CS21002-OBJECT ORIENTED PROGRAMMING

Course Objectives
Develop ability to
1. Each design pattern systematically names, explains, and evaluates an important and recurring design in object-oriented systems.
2. The goal of design patterns is to capture design experience in a form that people can effectively use.
3. At the end of design patterns course it has documented some of the most important design patterns and presented them as a catalog.
4. To understand that design patterns are standard solutions to common software design problems.
5. To be able to use systematic approach that focuses and describes abstract systems of interaction between classes, objects, and communication.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Understand common design patterns in the context of incremental/iterative development.
CO2. Analyze and combine design patterns to work together in software design.
CO3. Use creational design patterns in software design for class instantiation.
CO4. Apply structural design patterns for better class and object composition.
CO5. Implement behavioral patterns for better organization and communication between the objects.

UNIT - I
Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT - II
Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary

UNIT - III
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.
UNIT - IV
Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT - V

TEXT BOOK(S)


REFERENCE BOOK(S)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32011-ADVANCED COMPUTER ARCHITECTURE
(PROFESSIONAL ELECTIVE I)

B.Tech. CSE - III Year, II Sem.

Prerequisite(s):
20CS22002-COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING

Course Objectives
Develop ability to
1. Understand fundamentals of computer design
2. Understand instruction level parallelism
3. Understand memory hierarchy in computer systems
4. Understand thread level parallelism
5. Understand different types of storage systems

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Describe fundamentals concepts of computer design
CO2. Explain different types of Parallelisms in Computer Architectures
CO3. Illustrate memory hierarchy methods
CO4. Describe Thread level parallelism
CO5. Distinguish different types of Storage systems

UNIT-I
Introduction: Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design. Instruction level parallelism (ILP) - over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of Instruction level parallelism (ILP)

UNIT-II
Instruction level parallelism (ILP) software approach - compiler techniques- static branch protection – VLIW approach - Hardware support for more ILP at compile time- Hard verses Soft Solutions

UNIT-III
Memory hierarchy design- cache performance- reducing cache misses’ penalty and miss rate
Virtual Memory- protection and examples of Virtual Machine.

UNIT-IV
Multiprocessors and thread level parallelism- Introduction, Centralized Shared-Memory Architectures, Performance of Symmetric Shared-Memory Multiprocessors Contents Distributed Shared Memory and Directory Based Coherence Synchronization, Basic Models of Memory Consistency: An Introduction to Crosscutting Issues, Multicore Processors and their Performance Fallacies and Pitfalls.
UNIT-V
Storage systems- Types, Buses, Redundant Array of Independent Disks (RAID), Errors and failures, bench marking a storage device, designing a I/O system.

TEXT BOOK(S)


REFERENCE BOOK(S)

Prerequisite(s):
20CS31002-COMPUTER NETWORKS

Course Objectives
Develop ability to
1. Develop a basic understanding of cryptography, its evolution, and some key encryption techniques used today.
2. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.
3. Illustrate Symmetric and asymmetric cryptosystem.
4. Develop an understanding of web security services and mechanisms, viruses, threats, IDS and concepts of firewalls.
5. Describe the enhancements made to IPv4 by IPsec.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explain the need for security and understand the fundamentals of cryptography knowledge.
CO2. Distinguish symmetric and asymmetric encryption systems and their vulnerability to various attacks.
CO3. Demonstrate the role of third-party agents in the provision of authentication services and basics of cryptographic Hash functions.
CO4. Analyze web security services and mechanisms and illustrate counter measures including firewalls and intrusion detection systems.
CO5. Comprehend and apply email security and IP security policies.

UNIT – I
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II
Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

UNIT – III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital SignatureScheme.

UNIT – IV


UNIT – V

E-Mail Security: Pretty Good Privacy, S/MIME

TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. To understand and describe syntax and semantics of programming languages and introduce important paradigms of programming languages.
2. Explore and acquire data, data types, and basic statements.
3. To understand call-return architecture and ways of implementing them.
4. To familiarize object-orientation, concurrency, and event handling in programming languages.
5. To develop programs in non-procedural programming paradigms.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Describe the syntax and semantics of programming languages and understand various Programming Paradigms.
CO2. Explain different constructs in programming languages with merits and demerits.
CO3. Design and implement sub programs in various programming languages and understand Abstract Data Types.
CO4. Acquire knowledge on different programming language features like object-orientation, concurrency, exception handling and event handling.
CO5. Distinguish functional, logic and scripting languages.

UNIT-I

UNIT-II
Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants.
Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence.
Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment.


UNIT-III
Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.


Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations.

UNIT –IV

Exception Handling and Event Handling: Introduction, Exception, Handling in Ada, C++, Java, and Introduction to Event Handling, Event Handling with Java and c #.

UNIT –V

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to

1. Demonstrate the concepts of distributed systems.
2. Design theoretical concepts namely virtual time, agreement and consensus protocol.
4. Distinguish the concepts of DFS and DSM.
5. Identify transaction in distributed environment and associated to namely, concurrency control, deadlocks and error recovery.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Analyze and identify the advantages and disadvantages of distributed system models using characteristics of the distributed system and the desired features.
CO2. Understand the importance of time & global states and coordination & agreement.
CO3. Understand various aspects of inter process communication.
CO4. Understand the concepts of distributed file systems and distributed shared memory.
CO5. Describe transactions and concurrency control in distributed systems.

UNIT - I

UNIT-II
Time and Global States: Introduction, Clocks Events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.
Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT-III
Inter Process communication: Introduction, The API for the internet protocols, External data representation and Marshalling, server communication, communication, Case study-IPC in UNIX.
Distributed objects and Remote Invocation: Introduction, Communication between distributed objects, RPC, Events and notifications.

UNIT-IV
Name Services: Introduction; Name Services and the Domain Name System, Directory Services.
Distributed shared memory: Introduction, Design and Implementation issues, Sequential consistency, other consistency models.

UNIT- V
Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

TEXT BOOK(S)

REFERENCE BOOK(S)
Course Objectives

Develop ability to
1. Understand the computer graphics system components and process involved in displaying output primitives and filled area primitives with an appreciation towards application areas.
2. Understand 2-D geometrical transformations and perform object clipping using 2-D viewing pipeline for the given 2-D object.
3. Understand 3-D geometrical transformations and perform object clipping using 3-D viewing pipeline for the given 3-D object.
4. Understand various illumination and surface rendering methods with the help of visible surface detection methods.
5. Understand steps involved in various computer animation techniques.

Course Outcomes (COs)

At the end of the course, student would be able to
CO1. Illustrate the various components of a computer graphics system.
CO2. Explain 2-D geometrical transformations and perform object clipping using various clipping algorithm.
CO3. Illustrate 3-D geometrical representation and perform object clipping using 3-D geometrical transformations.
CO4. Illustrate the use of surface detection methods for 3-D viewing.
CO5. Explain the steps involved in various computer animation techniques.

UNIT-I
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham’s and DDA Algorithm), mid-point circle and ellipse algorithms
Filled area primitives: Scan-line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT-II
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.
UNIT-III
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

UNIT-IV
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.
Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

UNIT-V
Illumination Models and Surface Rendering Methods: Light Sources, Basic illumination models, polygon rendering methods, Ray Tracing methods.
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOK(S)

REFERENCE BOOK(S)
B.Tech CSE

Department of Computer Science and Engineering

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32015-BLOCKCHAIN TECHNOLOGIES
(PROFESSIONAL ELECTIVE II)

Prerequisite(s):
20CS31002-COMPUTER NETWORKS

Course Objectives
Develop ability to
1. Understand basic concepts in Block chain and its applications.
2. Acquire knowledge on Block chain concepts like consensus algorithms, smart contracts and distributed hyper ledger with applications.
3. Have a clear insight on importance of hash algorithm for centralised and decentralised algorithms is to be analysed, so that students will be able to know how to store the data in secure place.
4. Understand uses cases for different applications are to be analyzed.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Understand the basics of Blockchain and compare the different types of blockchains.
CO2. Explain the significance of Bitcoin and Apply different consensus algorithms for cashless transactions.
CO3. Understand the basics of Hyperledger Fabric and illustrate its need.
CO4. Understand various applications of Blockchain.
CO5. Understand the role of Privacy and Security in Blockchain.

UNIT-I
Introduction To Blockchain: Basics of Block chain, Block chain Components, structure and operational aspects of Bitcoin block chain, and compare different types of block chains, Basic crypto primitives: Hash, Signature, Hash chain to Block chain, Cryptographic Hash Functions, Merkle Tree, Block chain Architecture and Design, Conceptualization.

UNIT-II
Consensus Algorithms And Permissioned Blockchain: Block Propagation, Consensus - Requirements for the consensus protocols, Scalability aspects of Block chain consensus protocols, Consensus in Bitcoin, Solving Double Spending, Attacks, Proof of Work (PoW), Proof of Stake (PoS), Proof of Burn, Proof of Elapsed Time (PoET), Mining.
Permissioned Block chain: Basics, Smart Contracts, Consensus State Machine Replication, Crowd Funding, distributed Consensus.
UNIT-III
**Hyperledger Fabric**: Transaction Flow, **Fabric Details**: Ordering Services, Channels (Single and Multiple Channels), Peer, Client Applications, Certificate Authority: Membership and Identity Management, Hyperledger Fabric Network Setup.  
**Hyperledger Composer**: Application Development, Network Administration.

UNIT-IV
**Blockchain Applications**: Financial Services: Cross border payments, KYC, international trade, **Health Care**: Food safety, **Supply chain and Logistics**: Trade logistics supply chain, diamond provenance, addressing supply chain fraud, **Public Sector**: Energy, Govt. applications (passport, audit and compliance, digital identity), **Retail**: Hyperledger Indy, GST, **Insurance**: Claims Processing, Risk Provenance.

UNIT-V
**Blockchain Security**: Open Network security properties, membership, and access control architecture, privacy using channels in hyper ledger fabric, Ledger in hyper ledger fabric.  
**Use Case**: Public distribution system social welfare systems Block chain Cryptography, Privacy and Security in Block chain

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**


**WEB REFERENCE**

1. [https://nptel.ac.in/courses/106/105/106105184/](https://nptel.ac.in/courses/106/105/106105184/)  
Prerequisite(s): None.

Course objectives
Develop ability to
1. Impart knowledge on sustainable construction strategies.
2. Understand green building assessment and LEED certification process.
3. Understand effective energy management systems for a smart building.
4. Learn emerging building materials and their application.
5. Understand green building implementation concepts.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Describe the need for green buildings.
CO2. Explain green building process and assessment.
CO3. Explain various approaches like landscaping, stormwater and energy management for green buildings.
CO4. Explain energy policies, water supply and wastewater strategies, and materials in the field of Civil Engineering construction used for green buildings.
CO5. Explain the implementation of green buildings and its future scope.

UNIT – I

UNIT– II

UNIT– III

UNIT– IV

UNIT – V

TEXTBOOK(S)

REFERENCE BOOK(S)
4. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
6. Indian Green Building Council Website: https://igbc.in/igbc/
8. For case studies: http://www.nmsarchitects.com/
B.Tech. CSE - III Year, II Sem.

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Understand different basic terms related to Indian Energy Scenario.
2. Understand the importance of energy conservation.
3. Understand different acts and policies related to energy conservation.
4. Understand about energy management and types of audits.
5. Understand basic types of management schemes in energy conservation.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explain the significance of energy in India.
CO2. Explain the importance of energy conservation.
CO3. Explain different acts and policies of energy conservation.
CO4. Prepare energy audit report.
CO5. Evaluate the energy saving and conservation in different electrical utilities.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
UNIT-V

TEXT BOOK(S)


REFERENCE BOOK(S)

Prerequisite(s): None.

Course Objectives
Develop ability to
1. Introduce basics of geometric modelling of physical objects,
2. Convert digital data to obtain physical components by metal subtraction and addition processes.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Select an appropriate geometric modelling scheme required for manufacturing.
CO2. Interpret machining operations required in subtractive manufacturing.
CO3. Distinguish additive manufacturing methods and comprehend on the process to be adopted.
CO4. Illustrate the robotic applications in manufacturing and assembly.
CO5. Select an appropriate polymer by comparing properties and manufacturing requirements.

UNIT-I
Geometric modelling - 2D, 2½ D, 3D Modelling; Solid representations-CSG, Boundary representations, VOXEL representations; Overview of digital manufacturing processes

UNIT-II
Subtractive Manufacturing – Introduction to G codes and M codes; Operations on CNC Lathe- Turning and facing; operations on CNC Mill-Planing, grooving and drilling; Introduction to simple CNC Program (Demonstration only);

UNIT-III
Additive Manufacturing- Stereo lithography, Selective Laser Sintering, Fused Deposition Modelling; Conversion of Geometric model to .stl for 3D printing (Demonstration only)

UNIT-IV
Robotic manipulations: Cutting- Laser Cutting, Plasma Cutting, Water jet cutting; bending; folding; stacking; weaving; stitching, Bio printing, Food Printing;

UNIT-V
Introduction to Engineering polymers- acetics (polyoxymethylene), ABS, (Acrilonitrile-Butadiene-Suylene), polycarbonates, polyphenylene ethers and oxides, polyamides (nylons); and thermoplastic polyethers.
TEXT BOOK(S)

1. Digital Fabrication, Philip F. Yuan, Neil Leach, Tonji University press
2. Digital Fabrication in Architecture, Luca Caneparo, Engineering and Construction, Springer

REFERENCE BOOK(S)

20EC32074 - PRINCIPLES OF COMMUNICATION SYSTEMS
(OPEN ELECTIVE II)

B.Tech. CSE - III Year, II Sem.

Prerequisite(s): None.

Note: Only Block Diagram Approach with Qualitative Treatment of the topics is required. Detailed mathematical treatment is not required.

Course Objectives
Develop ability to

1. Introduce the students to modulation and various analog and digital modulation schemes.
2. They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Distinguish various types of modulations.
CO2. Explain different communication modules and their implementation.
CO3. Distinguish various wireless and cellular, mobile and telephone communication systems.

UNIT-I
Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT-II

UNIT-III
Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT-IV

UNIT-V
Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.
**Wireless Technologies:** Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

**TEXT BOOK(S)**

2. Kennedy, Davis, Electronic Communications Systems, 4e, TMH, 1999

**REFERENCE BOOK(S)**

1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House
B.Tech CSE

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20MB32076- SUPPLY CHAIN MANAGEMENT  
(OPEN ELECTIVE II)  

B.Tech. CSE - III Year, II Sem.  

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Prerequisite(s): None.

Course Objectives
Develop ability to
1. Distinguish the different functional areas in business management; understand the cross functional integrations and map supply chains of various business sectors.
2. Identify different types of distribution/ modes of transport/ network design.
3. Analyze the operational issues in SCM.
4. Recognize the drivers of the supply chain.
5. Interpret the importance of relationships with suppliers and customers.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Understand the role of an Engineer as well as Manager in Supply chain management.
CO2. Understand the importance of logistics in integrating different functional areas.
CO3. Integrate operations with functional areas.
CO4. Explain the role of logistics and distribution as supply chain drivers.
CO5. Understand the importance of supplier and customer relationship management.

UNIT-I  
Introduction to Supply Chain Management  
Understanding the Supply Chain, Supply Chain Performance: Achieving Strategic Fit and Scope including: Customer and Supply Chain Uncertainty, Competitive and Supply Chain Strategies, Product development strategy, Marketing and sales strategy, Supply chain strategy, Scope of strategic fit; Supply Chain Drivers and Metrics.

UNIT-II  
Logistics Management  
Designing distribution networks and applications to e-Business, Network design in the Supply Chain, Designing global supply chain, network design, 3 PL, 4 PL, Transportation in supply chain management.

UNIT-III  
Planning and managing inventories  
Managing Economies of Scale in a Supply Chain: Cycle Inventory, Managing Uncertainty in a Supply Chain: Safety Inventory, Determining the Optimal Level of Product Availability, Demand Forecasting in a Supply Chain, Aggregate Planning in a Supply Chain, Sales and Operations Planning: Planning Supply and Demand in a Supply Chain, Coordination in a Supply Chain. E- Procurement, Global alliances.
UNIT-IV
Managing Cross-Functional Drivers in a Supply Chain
Importance of sourcing decisions in Supply Chain Management, Price and Revenue management, role of Information Technology in a Supply Chain, Sustainability and the Supply Chain. Customer Relationship management.

UNIT-V
Logistics and supply chain relationships

TEXT BOOK(S)

REFERENCE BOOK(S)
1. The Toyota Way Paperback by Jeffrey Liker.
Prerequisite(s):
20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I LAB
20CS31L02-COMPUTER NETWORKS LAB

Course Objectives
Develop ability to
1. Assess the vision and introduction of IoT and understanding how M2M is connected to internet of things
2. Identify the appropriate Hardware and software components of IoT for communication
3. Gain knowledge on Cloud Storage models, web servers and how to integrate device, data and cloud management framework for IoT.
4. Learn the concepts of various data analytics and operational technology security with IoT.
5. Understand advanced and emerging concepts fog computing and Edge computing-IoT

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Interpret the vision of IoT from a global context, compare and contrast M2M and IoT Technology
CO2. Relate the appropriate Hardware and software components of IoT for providing the communication among the devices
CO3. Implement device, data and cloud management services for IoT applications.
CO4. Explore various data analytical techniques and operational security for IoT applications.
CO5. Comprehend the need of Fog Computing and Edge Computing-IoT

List of Experiments

Week-1
Getting Started with IoT (Arduino).

Week-2
Write an Arduino sketch to blink an LED Light for a particular interval of time.

Week-3
Write an Arduino sketch to measure the distance(in cms) of a certain object.

Week-4
Write an Arduino sketch to
a. Blink an LED and a buzzer if the distance measured is less than a threshold value
b. Illustrate the working of PIR Sensor with an example.
c. Illustrate the IR and DHT Sensor.

Week-5
Write an Program to send the humidity and temperature data to Cloud (ThingSpeak)

Week-6
Write a program to alert the user through SMS and Email notification if humidity is greater than a threshold value using IFTTT and Thingspeak cloud.

Week-7
Write a Python program that blinks an LED at a rate of 3 second ON, 1 second OFF

Week-8
Connect a PIR sensor to the GPIO pins of the Raspberry Pi. Perform measurements to determine the range of the sensor, i.e., start with a small distance (e.g., a few inches) and see if the motion sensor responds. Repeat these for increasing distances until the sensor stops responding. Report the measured distance.

Week-9
Select at least 1 input sensor (not PIR) and 1 output device and make the RPi control the chosen output device in response to activity by the input device (e.g., a temperature sensor as input and two or more LEDs indicating the current temperature in binary code).

Week-10
Write a python program for client-server based intruder detection system using mqtt application layer protocol

Week-11
Write an Arduino sketch to blink an LED Light for a particular interval of time using wireless communication protocol (LoRa)

Case study:

1. Assume that you are in a college, design and implement a IoT prototype to measure the amount of usage of water at a given location (take the location from user) on a day to day basis and send the information to Cloud.
2. Receive the above information from the sensors/ cloud and apply necessary algorithms to predict the amount of water being wasted at a particular location and also send a notification to the user.
Course Objectives
Develop ability to
1. Understand the basic concepts of R-programming. Learn descriptive statistics and data types in R-programming. Describes the shape, centre, and spread of sampling distributions of sample statistics.
2. Recognize the logic and framework of the inference of hypothesis testing.
3. Use regression analysis to predict the value of a dependent variable based on an independent variable.
4. Learn the concepts of SVM and Kernel methods.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Perform built-in commands and operations with matrices in R-programming. Analyse the appropriate data type of variables and evaluate various Frequency Distributions in R-programming. Determine the mean and standard deviation of a sampling distribution using R.
CO2. Develop a code for testing of hypothesis using Z-test, t-test, chi-square test, F-test.
CO3. Classify Linear and Logistic regression.

List of Experiments
Week-1 Introduction to R Programming.
Week-2 Introduction to descriptive statistics using R (Frequency Distribution and Cumulative Distribution Function).
Week-3 Acceptance/Rejection Sampling in R.
Week-4 Maximum likelihood and method of moments estimation. Testing of Hypothesis based on Z-test. Concept of p-value in R.
Week-5 Testing of hypothesis based on t-test, chi-square test and F-test. Confidence interval estimation in R.
Week-6 Multiple linear regression: Outlier analysis, residual analysis, test for normality, multi-collinearity in R.
Week-7 Logistic Regression in R.
Week-8 Classification with SVM in R.
Week-9 Dimensionality reduction with PCA in R and K-means Clustering in R.
Week-10 Kernal PCA and Kernal SVM in R.
List of Additional programs

1. Generating Functions (Binomial, Poisson, Uniform, Normal and Exponential) using R.
2. Multiple linear regression: Testing overall hypothesis and testing significance of individual variables, model selections and prediction in R.
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20EN32P01 - ENGLISH FOR PROFESSIONAL SUCCESS
B.Tech. CSE - III Year, II Sem.

Prerequisite(s): None

Course Objectives
Develop ability to
1. Recognize and understand the meanings of Phrases, Phrasal verbs and Idioms.
2. Read critically to comprehend the given text.
3. Understand the nature and importance of presentation skills.
4. Know the importance of organizational communication.

Course Outcomes (Cos)
At the end of the course, student would be able to
CO1. Appreciate the value of using Phrases, Phrasal verbs and Idioms.
CO2. Identify the supporting statements, their relevance or irrelevance, common arguments, opposing points of views and refutations.
CO3. Use effective body language and tone to deliver a fervent and well-knit presentation.
CO4. Prepare circulars, notices, minutes and memos effectively.

Module-I
Advanced Vocabulary

Module-II
Critical Reading
Reading: Book review/ Article review: reviewing skills.

Module-III
Oral Skills

Module-IV
Official Correspondence
Writing: Circulars, notices, memos, Agenda, Minutes of Meeting (MoM)
Letter of Recommendation.

Classroom Activity based Course. Hence, Lab. is not required.
TEXT BOOK(S)

2. All About Words: an adult approach to vocabulary by Maxwell Nurnberg, Prentice-Hall.

REFERENCE BOOK(S)

20MA32P01- LOGICAL REASONING - II

B.Tech. CSE - III Year, II Sem.

Prerequisite(s):
20MA31P01 - LOGICAL REASONING-I

Course Objectives
Develop ability to

1. Distinguish between permutation and combination and demonstrate how to determine each; Understand the basic concept of probability and illustration of Venn diagram; Classify the numbers and compute LCM, HCF, Square Roots, Cube Roots, Surds and Indices; Understand the concepts of allegation and mixture
2. Distinguish between the linear and circular sitting arrangements and also understand the coding and decoding problems; Understand the pattern of number and letter series.
3. Understand concepts of calendars; Classify the different forms of Alphabet Arrangements; Interpret the clues in the form of direction wise.
4. Identify the placements of numerals and hands on clock; Understand the various properties of cubes; Understand the concepts of data sufficiency and data interpretation.

Course Outcomes (COs)
At the end of the course, students would be able to

CO1. Analyze the difference between permutation and combination and solve various arrangement and selection related problems; Evaluate probability problems using various rules; Apply appropriate methods to evaluate LCM, HCF, Square Roots, Cube Roots, Surds and Indices; Apply the rules of allegation to solve the problems related to mixture.

CO2. Analyze the linear and circular sitting arrangements and also solve the coding and decoding problems with same and different set of letters; Evaluate the problems of number and letter series.

CO3. Solve calendar related problems; Illustrate different forms of Alphabet Arrangements and problems based on letter word; Solve the problems using the various concepts of directions.

CO4. Perform mathematical operations on clocks; Evaluate various problems on cubes and cuboids; Solve problems on data sufficiency and interpretation of data using various types of graphs.

Quantitative Aptitude:


3. **Number system:** Classification of numbers, Divisibility rules, Finding the units digit, Finding remainders in divisions involving higher powers, LCM and HCF Models, Decimal fractions, Simplifications, Square Roots & Cube Roots, Surds and Indices.

4. **Allegation and Mixture:** Definition of allegation, mean price, rules of allegation on quantity and cost price, diagrammatic explanation, removal and replacement.

**Logical Reasoning:**

5. **Sitting Arrangement:** Problems on Linear arrangement, Problems on Circular arrangement, Problems on Double line-up, Problems on Selections, Problems on Comparisons. **Coding and decoding:** Coding using same set of letters, Coding using different set of letters, Coding into a number Comparison & Elimination.

6. **Number and letter Series:** Difference series, Product series, Squares series, Cubes series, Alternate series, Combination series, Miscellaneous series, Place values of letters.

7. **Day sequence/Calendars:** Definition of a Leap Year, Finding the number of Odd days, framing the year code for centuries, finding the day of any random calendar date.

8. **Alphabet Test:** Alphabetical order of verbs, letter-word problems, rule-detection, alphabetical quibble, word formation.

9. **Direction sense Test:** Direction from the initial point: directions, cardinal directions, problems on distances, problems on clocks, problems on angles, problems on shadows.

10. **Clocks:** Finding the angle when the time is given, Finding the time when the angle is known, Relation between Angle, Minutes and Hours, Exceptional cases in clocks.

11. **Cubes:** Basics of a cube, finding the minimum number of cuts when the number of identical pieces are given, Finding the maximum number of pieces when cuts are given, Problems on painted cubes of same and different colours, Problems on cuboids, Problems on painted cuboids, Problems on Dice.

12. **Data Sufficiency:** Different models in Data Sufficiency, Problems on Data sufficiency, Problems on data redundancy. **Data Interpretation:** Problems on tabular form, Problems on Line Graphs, Problems on Bar Graphs, Problems on Pie Charts.

**TEXT BOOK(S)**

REFERENCE BOOK(S)

Course Objective
Develop ability to
1. Imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Understand the importance of Values and Ethics in their personal lives and professional careers.
CO2. Learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I
Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II

UNIT - III
Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - IV
Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research
misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT - V

TEXT BOOK(S)


REFERENCE BOOK(S)

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20CS41001-BIG DATA ANALYTICS  
B.Tech. CSE - IV Year, I Sem.  

Prerequisite(s):  
20CS21002-OBJECT ORIENTED PROGRAMMING  
20CS21003-DATABASE MANAGEMENT SYSTEMS

Course Objectives  
Develop ability to  
1. Know the basic elements of Big Data and Data science to handle huge amount of data.  
2. Gain knowledge of basic mathematics behind the Big data.  
3. Understand the different Big data processing technologies.  
4. Apply the Analytical concepts of Big data using R and Python.  
5. Visualize the Big Data using different tools.

Course Outcomes (COs)  
At the end of the course, student would be able to:  
CO1. Describe Big Data elements and Architectures.  
CO2. Apply different mathematical models for Big Data.  
CO3. Explain all the data processing components of Hadoop architecture by developing different applications.  
CO4. Analyze data using R.  
CO5. Employ appropriate tools for big data visualization.

UNIT-I  

UNIT-II  

UNIT-III  
Big Data processing: Big Data technologies, Introduction to Google file system, Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map Reduce tasks, Job, Task trackers, Introduction to NOSQL, Textual ETL processing.  

UNIT-IV  
Big Data analytics: Data analytics life cycle, Data cleaning , Data transformation, Comparing reporting and analysis, Types of analysis, Analytical approaches, Data analytics using R, Exploring basic features of R, Exploring R GUI, Reading data sets, Manipulating and processing data in R, Functions and packages in R, Performing graphical analysis.
UNIT – V
Big Data Visualization: Introduction to Data visualization, Challenges to Big data visualization, Types of data visualization, Visualizing Big Data, Tools used in data visualization, Proprietary Data Visualization tools, Open source data visualization tools, Data visualization with Tableau.

TEXT BOOK(S)


REFERENCES BOOK(S)

1. Algorithmic and Analysis Techniques in Property Testing, Dana Ron, School of EE, 2010.
20CS41002-MACHINE LEARNING

Prerequisite(s):
20MA32001-STATISTICS FOR MACHINE LEARNING

Course Objectives
Develop ability to
1. To understand the basic concepts of machine learning and probability theory.
2. To appreciate supervised learning and their applications.
3. To understand unsupervised learning like clustering and EM algorithms.
4. To understand the theoretical and practical aspects of probabilistic graphical models.
5. To learn other learning aspects such as reinforcement learning, representation learning, deep learning, neural networks and other technologies.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Discuss the machine learning process and its challenges.
CO2. Explain different regression and classification models.
CO3. Choose appropriate Unsupervised learning model.
CO4. Explain probability based learning methods.
CO5. Compare the different advanced learning methods.

UNIT-I
Introduction

UNIT-II
Supervised Learning

UNIT-III
Unsupervised Learning

UNIT-IV
GraphicalModels

UNIT-V
AdvancedLearning

TEXT BOOK(S)

REFERENCE BOOK(S)
B.Tech CSE

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20CS41003-CLOUD COMPUTING
B.Tech. CSE - IV Year, I Sem.

Prerequisite(s):
20CS22003-OPERATING SYSTEMS

Course Objectives
Develop ability to
1. Understand different computing models.
2. Introduce various types of virtualizations and hypervisors
3. Use and adopt Cloud Computing services and tools in their real life scenarios.
4. Explore some important cloud computing driven commercial systems such as Amazon Web Services, Google cloud services, Microsoft Azure etc.
5. Describe the security aspects in cloud

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Distinguish different types of Distributed Computing models and Identify different cloud computing models and services provided by cloud providers
CO2. Illustrate Cloud Applications and Paradigms
CO3. Demonstrate virtualization of clusters and datacenters
CO4. Apply and design Cloud Resource Management and scheduling algorithms
CO5. Explain Storage models and security aspects of Cloud

UNIT-I

UNIT-II
UNIT-III

UNIT-IV
**Storage Systems:** The Evolution of Storage Technology, Storage Models, File Systems, and Databases, Distributed File Systems: General Parallel File System, Google File System, Transaction Processing and NoSQL Databases, BigTable, Megastore Cloud
**Application Development** Amazon Web Services: EC2 Instances, Security Rules for Application and Transport Layer Protocols in EC2, How to Launch an EC2 Linux Instance and Connect to it, How to Use S3 in Java, How to Install the Simple Notification Service on Ubuntu.

UNIT-V

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**

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20CS41012-WEB SERVICES  
(PROFESSIONAL ELECTIVE – III)

B.Tech. CSE - IV Year, I Sem.

Prerequisite(s):
20CS22004-WEB TECHNOLOGIES

Course Objectives
Develop ability to
1. Summarize evolution, emergence, introduction and architecture of web services.
2. Discover core fundamentals of REST and Resource Oriented Architecture.
3. Understand Web Services Description Language.
4. Implement the Services and design the Client Representations.
5. Understand big web problems solved by Web Services.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1: Describe the components of programmable web.
CO2: Describe evolution, emergence, introduction and architecture of web services.
CO3: Apply RESTful Services in web service architectures.
CO4: Articulate REST and ROA Practices.
CO5: Distinguish different web services architectures.

UNIT-I

Writing Web Service Clients -Web Services Are Web Sites, del.icio.us: The Sample Application, Making the Request: HTTP Libraries, Processing the Response: XML Parsers, JSON Parsers: Handling Serialized Data
Clients Made Easy with WADL

UNIT-II
What Makes RESTful Services Different?- Introducing the Simple Storage Service, Object-Oriented Design of S3, Resources, HTTP Response Codes, An S3 Client , Request Signing and Access Control, Using the S3 Client Library, Clients Made Transparent with ActiveResource, Parting Words.


UNIT-III
Designing Read-Only Resource-Oriented Services- Resource Design,Turning Requirements Into Read-Only Resources, Figure Out the Data Set, Split the Data Set into Resources, Name the Resources, Design Your Representations, Link the Resources to Each Other, The HTTP Response.
Designing Read/Write Resource-Oriented Services - User Accounts as Resources, Custom Places, A Look Back at the Map Service.

UNIT-IV
A Service Implementation - A Social Bookmarking Web Service, Figuring Out the Data Set, Resource Design, Design the Representations Accepted from the Client, Design the Representations Served to the Client, Connect Resources to Each Other, What’s Supposed to Happen?, What Might Go Wrong?, Controller Code, Model Code, What Does the Client Need to Know?.


UNIT-V
The Building Blocks of Services - Representation Formats, Prepackaged Control Flows Hypermedia Technologies.

The Resource-Oriented Architecture Versus Big Web Services - What Problems Are Big Web Services Trying to Solve?, SOAP, WSDL, UDDI, Security, Reliable Messaging, Transactions, BPEL, ESB, and SOA.

TEXT BOOK(S)

REFERENCE BOOK(S)
Course Objectives
Develop ability to
1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improve their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explain the working of Android OS and application components.
CO2. Develop Android user interfaces.
CO3. Use intents, broadcasts and notifications in Android applications.
CO4. Identify suitable Storage Techniques.
CO5. Use the basics of SQL and construct queries using SQL in database creation and interaction.

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools
Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II
Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components

Department of Computer Science and Engineering
Fragments—Creating fragments, Life cycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III
Intents and Broadcasts: Intent—Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS
Broadcast Receivers—Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity
Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV
Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V
Database—Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOK(S)

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.

REFERENCE BOOK(S)

20CS41014-DIGITAL IMAGE PROCESSING
(PROFESSIONAL ELECTIVE – III)

B.Tech. CSE - IV Year, I Sem.

Prerequisite(s): None

Course Objectives
Develop ability to
1. Understand the fundamental steps in image processing and various components of image processing system.
2. Understand spatial and frequency domain filters for smoothening and sharpening operations on images.
3. Understand morphological operations, segmentation and edge detection on images.
4. Understand various concepts related to image compression and color image processing.
5. Identify the need for and perform object representation, description and image transformations.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explain the fundamental steps in image processing and various components of image processing system.
CO2. Apply spatial and frequency domain filters for smoothening and sharpening operations on images.
CO3. Perform morphological operations, segmentation and edge detection on images.
CO4. Explain the various concepts related to image compression and color image processing.
CO5. Explain the need for and perform object representation, description and image transformations.

UNIT-I
Fundamental steps of image processing, components of an image processing of system, the image model and image acquisition, sampling and quantization, station ship between pixels, distance functions, scanner.

UNIT-II
Statistical and spatial operations, Grey level transformations, histogram equalization, smoothing and sharpening–spatial filters, frequency domain filters, homomorphic filtering, image filtering and restoration. Inverse and weiner filtering. FIR weiner filter. Filtering using image transforms, smoothing splines and interpolation.

UNIT-III
Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.
Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and Laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

UNIT-IV
Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding. Basics of color image processing, pseudo color image processing, color transformation, color smoothing and sharpening, color segmentation, color image compression, compression standards.

UNIT-V
Image Transforms - Fourier, DFT, DCT, DST, Haar, Hotelling, Karhunen - Loeve, Walsh, Hadamard, Slant. Representation and Description - Chain codes, Polygonal approximation, Signatures Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, PCA.

TEXT BOOK(S)


REFERENCE BOOK(S)

B.Tech CSE - IV Year, I Sem.

Prerequisite(s):
20CS31003-ARTIFICIAL INTELLIGENCE

Course Objectives
Develop ability to
1. Understand various learning models.
2. Learn feed forward neural networks for learning
3. Learn to use auto encoders and regularization
4. Understand Convolution Neural Networks for learning
5. Understand Recurrent Neural Networks for learning

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Analyze various learning models.
CO2. Use feed forward neural networks for learning
CO3. Highlight the importance of auto encoders and regularization
CO4. Apply Convolution Neural Networks for learning
CO5. Apply Recurrent Neural Networks for learning

UNIT-I
Introduction: Historical Trends in Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Perceptron, Perceptron Learning Algorithm, Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feedforward Neural Networks, Representation Power of Feedforward Neural Networks

UNIT-II
FeedForward Neural Networks, Backpropagation, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Basis Principal Component Analysis and its interpretations, Singular Value Decomposition

UNIT-III
Auto encoders: relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Contractive auto encoders. Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameters sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Greedy Layerwise Pre-training, Better activation functions, better weight initialization methods, Batch Normalization
UNIT-IV

Convolutional Neural Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, DataTypes, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, DeepDream, DeepArt, Fooling Convolutional Neural Networks

UNIT-V

Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs, Encoder Decoder Models, Attention Mechanism, Attention over images

TEXTBOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. Acquire knowledge on parallel and distributed databases and its applications.
2. Study the usage and applications of Object Oriented databases.
3. Learn the modeling and design of databases.
4. Acquire knowledge on parallel and distributed databases and its applications.
5. Equip students with principles and knowledge of parallel and object oriented databases.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Describe theoretical and practical aspects of distributed database systems.
CO2. Study and identify various issues related to the development of distributed database system.
CO3. Explain design aspects of object oriented database system and related development.
CO4. Highlight distributed transaction management and reliability; parallel and object database management systems.
CO5. Describe distributed DBMS architecture and design; query processing and optimization

UNIT-I
Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

UNIT-II

UNIT-III
The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions Concurrency Control,
Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

**UNIT-IV**

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

**UNIT-V**

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multi database Concurrency Control, Multi database Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

**TEXT BOOK(S)**


**REFERENCES BOOK(S)**

20CS41017-IOT ANALYTICS
(PROFESSIONAL ELECTIVE – IV)

B.Tech. CSE - IV Year, I Sem.

Prerequisite(s):
20CS32001-INTERNET OF THINGS

Course Objectives
Develop ability to
1. Basic understanding required to perform IoT analytics, revise statistical method used in IoT Analytics.
2. Mathematical foundation of regression, understanding of dimensionality reduction and analysis technique.
3. Learn time series forecasting techniques for real time IoT data.
4. Basic clustering techniques to analyses unstructured IoT data.
5. Learn classification and ML model to deal with structural data.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Illustrate the working of IoT systems.
CO2. Explain models for time series data.
CO3. Apply dimensionality reduction and regression to data.
CO4. Compare and contrast different clustering algorithms.
CO5. Illustrate different classification algorithms.

UNIT-I
Introduction- The Internet of Things (IoT), IoT Application Domains, IoT reference model, Performance evaluation and modelling of the IoT Systems, Machine Learning and Statistical techniques for IoT.

UNIT-II
simple linear regression, Multivariable linear regression, polynomial regression, confidence and prediction interval. Ridge, Lasso, and Elastic net Regression.
Dimensionality Reduction: A review of eigen values and eigen vectors, Principal Component Analysis, Linear and multiple discriminant analysis.

UNIT-III
Time series forecasting techniques, Stationary time series, moving average (MA(q)) model, the autoregressive model, ARIMA model, Decomposition models, Forecast accuracy, Prediction Interval, Vector Autoregression,

UNIT-IV
UNIT-V

TEXTBOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. To understand the fundamental concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. To gain knowledge on transaction flow testing and data flow testing techniques.
3. To identify various software testing types and levels of testing like black and white box testing along with levels of unit test, integration, regression, and system testing.
4. To understand the concepts of state graphs, graph matrixes and transition testing along with testability tips in order to enhance the testing process in different way.
5. To apply skills in software test automation and management using latest tools.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. To identify the basic concepts of software testing and its essentials.
CO2. To identify the various bugs and correct them after knowing the consequences of the bug.
CO3. Evaluate an effective, step-by-step process for identifying needed areas of testing, designing test conditions, building and executing test cases.
CO4. Evaluate program’s control flow as a structural model and to perform functional testing using control flow and transaction flow graphs.
CO5. Design and develop the best test strategies in accordance to the development model.

UNIT-I
Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II
Transaction Flow Testing:-transaction flows, transaction flow testing techniques.
Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.
Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.
UNIT-III
Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV
State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips.

UNIT-V
Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Exposure to a tool like JMeter or Win-runner).

TEXT BOOK(S)


REFERENCE BOOK(S)

B.Tech. CSE - IV Year, I Sem.

**Prerequisite(s):**
20CS12002-DISCRETE MATHEMATICS

**Course Objectives**
Develop ability to
1. Understand Fuzzy Logic techniques and their roles in building intelligent machines.
2. Learn fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
3. Learn Evolutionary Computation Methods to find solutions to complex problems
4. Understand parameter choices in the use of Evolutionary Computation
5. Understand current research in Genetic Algorithms and Evolutionary Computing

**Course Outcomes (COs)**
At the end of the course, student would be able to
CO1. Identify Fuzzy Logic techniques and their roles in building intelligent machines.
CO2. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
CO3. Apply Evolutionary Computation Methods to find solutions to complex problems
CO4. Analyze and experiment with parameter choices in the use of Evolutionary Computation
CO5. Summarize current research in Genetic Algorithms and Evolutionary Computing

**UNIT-I**
Introduction to Computational Intelligence.
**Basic Fuzzy Set Theory:** Introduction, A Brief History, Fuzzy Membership Functions and Operators, Alpha-Cuts, Decomposition Theorem, Extension Theorem.
**Fuzzy Relations and Fuzzy Logic Inference:** Introduction, Fuzzy Relations and Propositions, Fuzzy Logic Inference and Fuzzy Logic for Real-Valued Functions.

**UNIT-II**
**Fuzzy Clustering and Classification:** Introduction to Fuzzy Clustering, Fuzzy C-Means, An Extension to Fuzzy C-Means, Possibilistic C-Means, Fuzzy Classifiers-Fuzzy.
Fuzzy Measures and Integrals: Fuzzy Measures, Fuzzy Integrals, Training the Fuzzy Integrals.

**UNIT-III**
**Evolutionary Computation:** Basic Ideas and Fundamentals, Evolutionary Algorithms: Generate and Test, Representation, Search and Selection Operators, Major Research and Application Areas.
**Evolutionary Optimization:** Global Numerical Optimization, Combinatorial Optimization, Some Mathematical Considerations, Constraint Handling, Self Adaptation.

**UNIT-IV**
**Evolutionary Learning and Problem Solving:** Evolving Parameters as Regression Equation, Evolving the Structure And Parameters Of Input-Output Systems, Evolving Clusters, Evolutionary Classification Models, Evolutionary Control Systems, Evolutionary Games.

**UNIT–V**
**Collective Intelligence and Other Extensions of Evolutionary Computation:** Particle swarm optimization, Differential Evolution, Ant Colony Optimization, Evolvable Hardware, Interactive Evolutionary Computation, Multicriteria Evolutionary Optimization.

**TEXTBOOK(S)**


**REFERENCE BOOK(S)**

20CS41L01-BIG DATA ANALYTICS LAB AND CLOUD COMPUTING LAB
B.Tech. CSE - IV Year, I Sem.

Prerequisite(s):
20CS21L02-OBJECT ORIENTED PROGRAMMING LAB

Big Data Analytics

Course Objectives
Develop ability to
1. Know the basic elements of Big Data and Data science to handle huge amount of data.
2. Gain knowledge of basic mathematics behind the Big data.
3. Understand the different Big data processing technologies.
4. Apply the Analytical concepts of Big data using R and Python.
5. Visualize the Big Data using different tools.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1: Observe Big Data elements and Architectures.
CO2: Apply different mathematical models for Big Data.
CO3: Demonstrate their Big Data skills by developing different applications.
CO4: Apply each learning model for different datasets.
CO5: Analyze needs, challenges and techniques for big data visualization.

List of Experiments

Week-1
Installation, Configuration, and Running of Hadoop and HDFS.

Week-2
Implement the following file management tasks in Hadoop: Adding files and directories, Retrieving files and Deleting files.

Week-3
Implementation of Word Count / Frequency Programs using MapReduce.

Week-4
Implementation of MR Program that processes a Weather Dataset.

Week-5
Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
Cloud Computing

Course Objectives
Develop ability to
1. Understand different computing models.
2. Introduce various types of virtualizations and hypervisors.
3. Use and adopt Cloud Computing services and tools in their real life scenarios.
4. Explore some important cloud computing driven commercial systems such as Amazon Web Services, Google cloud services, Microsoft Azure etc.
5. Describe the security aspects in cloud.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Distinguish different types of Distributed Computing models and Identify Different cloud computing models and services provided by cloud providers.
CO2. Illustrate Cloud Applications and Paradigms.
CO3. Demonstrate virtualization of clusters and data centers.
CO5. Explain Storage models and security aspects of cloud.

List of Experiments

Week-1
Create Virtual machines using Open source software: VM Ware/ Oracle VirtualBox.

Week-2
Use Amazon EC2 to create a Virtual machine.

Week-3
Use Amazon S3 to create bucket and upload objects.

Week-4
Install the Simple Notification Service on Ubuntu.

Week-5
Use Amazon Cloud front to create Distribution and Use Amazon Route53 to create a domain (example: .com, .in).

Week-6
Study and Implement Cloud Security management by VPC.

Week-7
Building a “Hello world” app for the cloud by using AWS Lambda.

Week-8
Installing and configuring python/java/PHP platform by using Google AppEngine.
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20CS41L02-MACHINE LEARNING LAB

B.Tech. CSE - IV Year, I Sem.

Prerequisite(s):
20CS11L01-PROGRAMMING FOR PROBLEM SOLVING – I  
20MA32L01-STATISTICS FOR MACHINE LEARNING LAB

Course Objectives
Develop ability to
1. To understand the basic concepts of machine learning and probability theory.
2. To appreciate supervised learning and their applications.
3. To understand unsupervised learning like clustering and EM algorithms.
4. To understand the theoretical and practical aspects of probabilistic graphical models.
5. To learn other learning aspects such as reinforcement learning, representation learning, deep learning, neural networks and other technologies.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Differentiate various machine learning techniques  
CO2. Implement supervised learning  
CO3. Implement unsupervised learning  
CO4. Use graphical models for learning  
CO5. Use reinforcement learning

List of Experiments
Note: Use Open-Source Software Tools, Programming Languages (Python) to perform the experiments or to implement the Machine Learning Algorithms.

Week-1
Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test datasets.

Week-2
Write a program to demonstrate the working of the decision tree algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a newsample.

Week-3
Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

Week-4
Write a program to implement Support Vector Machine algorithm to classify the iris
data set. Print both correct and wrong predictions.

**Week-5**
Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

**Week-6**
Apply Hierarchical Clustering algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

**Week-7**
Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Dataset.

**Week-8**
Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate datasets.

**Week-9**
Write a program to implement AdaBoost algorithm to classify theiris data set. Print both correct and wrong predictions.

**Week-10**
Perform model aggregation on MNIST digit dataset.
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20CS42003-HUMAN COMPUTER INTERACTION
(PROFESSIONAL ELECTIVE V)

B.Tech. CSE - IV Year, II Sem.

Prerequisite(s):
20CS22004-WEB TECHNOLOGIES

Course Objectives
Develop ability to
1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Understand mobile HCI.
4. Learn the guidelines for user interface.
5. Develop meaningful user interface.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Design effective dialog for HCI.
CO2. Design effective HCI for individuals and persons with disabilities.
CO3. Describe mobile ecosystem and elements of mobile design.
CO4. Explain the HCI implications for designing multimedia/ e-commerce/ e-learning Web sites.
CO5. Develop meaningful user interface.

UNIT-I
Foundations of HCI

UNIT-II
Design & Software Process

UNIT-III
Models and Theories
UNIT-IV
Mobile HCI

UNIT-V
Web Interface Design

TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. To understand the specific roles within a software organization as related to project and process management.
2. To illustrate the basic infrastructure competences required for project management and its problem solving skills.
3. To apply the principles of software engineering and elaborate lifecycle phases.
4. To identify various project and process metrics.
5. To design the basic steps of project planning, project and process management, quality assurance and their relationships.

Course Outcomes (COs)
At the end of this course, student would be able to
CO1. Estimate the performance of the project based on cost, and quality.
CO2. Distinguish the strategies involved in improving the software economics.
CO3. Understand the software phases and artifacts in order to build process models.
CO4. Analyze embedded software models and implement a project to manage project schedule, expenses and resources with the application of suitable protect management tools.
CO5. Evaluate the project using project and process metrics.

UNIT–I

UNIT–II
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer-inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT–III
UNIT–IV

UNIT–V

TEXTBOOK(S)


REFERENCE BOOK(S)

Course Objectives

1. Understand and implement classical models and algorithms in data warehousing and data mining.
2. Design and build a data warehouse from heterogeneous data sources using data integration tools.
3. Identify the problems and analyze given data and choose the relevant models and algorithms.
4. Apply models and algorithms for mining the data and to discover knowledge and generate reports accordingly.
5. Assess the strengths and weaknesses of various methods and algorithms and analyze their behavior.

Course Outcomes (COs)

At the end of the course, students would be able to:

CO1. Identify the methodology used in legacy databases for data warehousing and data mining to derive business rules for decision support systems.

CO2. Apply the knowledge gained from different patterns evaluated during data mining processes.

CO3. Analyze data mining techniques to solve problems in other disciplines in a mathematical way.

CO4. Compare and evaluate different data mining techniques like classification, prediction.

CO5. Apply the principles in web mining, text mining, and ethical aspects of data mining.

UNIT 1

UNIT– II
Introducing to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity – Basics.

UNIT– III

UNIT– IV
Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of classifiers, Classification Techniques, Decision Tree – Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naïve Bayes Classifier, Bayesian Belief Networks; K – Nearest neighbour classification – Algorithm and Characteristics.

UNIT– V

TEXTBOOK(S)


REFERENCEBOOK(S)

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20CS42006-DIGITAL FORENSICS  
(PROFESSIONAL ELECTIVE V)  

B.Tech. CSE - IV Year, II Sem.  

Prerequisite(s):  
20CS22003- OPERATING SYSTEMS  

Course Objectives  
Develop ability to  
1. To understand the cyber space.  
2. To gain knowledge on fundamentals of Digital forensics.  
3. To understand the evidence capturing process.  
4. To understand the preservation of digital evidence.  
5. To understand different file systems and disk encryption.  

Course Outcomes (COs)  
At the end of the course, student would be able to  
CO1. Illustrate the Digital forensics evidence, capture and data recovery.  
CO2. Summarize Evidence Collection and Data Seizure.  
CO3. Use the network forensics in reconstructing the evidence.  
CO4. Apply forensics tools in the event of cyber-crime.  
CO5. Analysis of digital forensics upon Windows and DOS systems.  

UNIT-I  

UNIT-II  
UNIT -III
Digital Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions
Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honey net project.
Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

UNIT -IV
Current Digital Forensic tools: evaluating Digital forensic tool needs, Digital forensics software tools, Digital forensics hardware tools, validating and testing forensics software
E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.
Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT-V
Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOK(S)

REFERENCE BOOK(S)
B.Tech. CSE - IV Year, II Sem.

Prerequisite(s): None

Course Objectives
Develop ability to
1. Acquire knowledge on disaster and assess their impact.
2. Comprehend the monitoring techniques of disasters.
3. Understand the issues and policies involved in the disaster management.
4. Evaluate the pre-disaster risk and vulnerability reduction strategies.
5. Assess the role of NGO’s, Government bodies and Public in the disaster mitigation and management.

Course Outcomes
At the end of the course, student would be able to
CO1. Explain the different types of disasters.
CO2. Evaluate the impact of disasters on the community.
CO4. Recommend appropriate vulnerability reduction strategy and risk techniques.
CO5. Estimate the disaster infrastructure development and role of NGO’s, Government bodies and Public in the disaster mitigation and management.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV


UNIT-V
Emerging approaches in Disaster Management – Three Stages
1) Pre-Disaster Stage (Preparedness)
2) Emergency Stage
3) Post Disaster Stage – Rehabilitation

TEXT BOOK(S)

2. Disaster Management, Dr. Mrinalini Pandey, Wiley India Pvt Ltd., 2014.

REFERENCE BOOK(S)

2. Natural Hazards and Disasters, Donald Hyndman and David Hyndman, Cengage Learning, 2013.
Prerequisite(s): None

Course Objectives
Develop ability to
1. To introduce to basics of Micro-electro-mechanical systems
2. To understand properties of materials involved in MEMS
3. To pertain fabrication methods involved in MEMS manufacturing
4. To apply the concepts for various applications

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Elucidate basic concepts involved in MEMS technologies
CO2. Realize the properties of various materials involved in MEMS technologies
CO3. Apply the concepts and technologies involved in designing of MEMS
CO4. Relate different manufacturing processes involved in fabrication of MEMS
CO5. Recognize micro sensors, micro actuators and their applications in various fields.

UNIT-I
Introduction to MEMS: What is MEMS, Historical Background, classification, Micro-engineering, importance of micro-engineering. Technological advancements in MEMS, advantages and disadvantages of MEMS.

UNIT-II
MEMS materials: Materials used in MEMS. Material properties: electrical, mechanical, thermal, chemical, biological, optical and processing. Reliability issues of materials

UNIT-III
Designing of MEMS: Design and analysis process for MEMS. Initial design process, structured design process. Commonly used design flow, structured design flow. Design flow for MEMS cad design. Design and verification flow for integrated MEMS.

UNIT-IV
MEMS fabrication Techniques: Photolithography, materials for micromachining, bulk micromachining Surface micromachining, High aspect-ration-micromachining, assembly and system integration.

UNIT-V
MEMS structures and devices: Mechanical sensors, mechanical actuators, micro-fluidic devices, optical/photonic micro-systems, biological transducers.
TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. Introduction to Engineering analysis of the automobiles and their sub systems.
2. Applications of engineering principles to automotive design.
3. Improves ability to understand the different types of engines and automobile bodies.
4. Familiarization with the automotive industry and its terminology.
5. Develops an idea of utilization of resources duly reducing emission levels for achieving eco-friendly environment.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Demonstrate the basic lay-out of an automobile.
CO2. Distinguish between SI and CI engine’s fuel system and cooling systems.
CO3. Classify the principles of fuel ignition systems.
CO4. Infer and select transmission system of an automobile
CO5. Differentiate the steering systems

UNIT – I
Introduction: History of Automobiles, Classification of Automobiles. Chassis and body building, Engine Terminology, Classification of Engines

UNIT-II
Fuel System: spark Ignition engines—Fuel tank, fuel filter, fuel pump, air cleaner/filter, carburetor types, injection of petrol engines. Compression Ignition engines, Fuel Injection System—air & solid injection system, Pressure charging of engines, super charging and turbo charging
Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System, Radiators, Cooling Fan—water pump, thermostat, evaporating cooling, pressure sealed cooling, antifreeze solutions.

UNIT-III
Ignition System: Function of an ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug—Magneto coil ignition system, Battery ignition system
UNIT-IV
Transmit System: Clutch principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, gear boxes, types. Propeller shaft, Hotch Kiss drive, Torque tube drive, universal joint, differential, live and dead axles, wheels and tyres.
Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder, tandem master cylinder, Requirement of brake fluid, Pneumatic and vacuum brakes.

UNIT-V
Steering System: Types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism.

TEXT BOOK(S)


REFERENCE BOOK(S)

1. Automotive Engines / Srinivasan
2. A Text Book of Automobile Engineering By Khalil U Siddiqui New Age International
3. Automobile Engineering / William H Crouse
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20EC42084 – BIOMEDICAL INSTRUMENTATION  
(OPEN ELECTIVE-III)  

B.Tech. CSE - IV Year, II Sem.  

Prerequisite(s): None  

Note: No detailed mathematical treatment is required and only elementary treatment is sufficient.  

Course Objectives  
Develop ability to  
1. Learn the basics of human physiology  
2. Understand the basics of bio-medical transducers and recorders.  
3. Understand the applications of measuring, recording and monitoring instruments.  
4. Understand the concepts of various medical instruments and supporting systems.  

Course Outcomes (COs)  
At the end of the course, student would be able to  
CO1. Explain the functioning of different human physiological systems.  
CO2. Explain the operations of transducers and recorders used for bio-medical applications.  
CO3. Explain the principles of medical imaging systems.  
CO4. Explain the principles of monitoring instruments used for bio-medical application  
CO5. Explain the need for health supporting systems.  

UNIT-I  
HUMAN PHYSIOLOGY  
Introduction to generalized medical instrumentation system, components of instrumentation system, physiological system of human body, cardiovascular system. Respiratory system, Nervous system, generation of bioelectric potentials, Action potential, resting potential, Neuronal communication.  

UNIT-II  
BIO-POTENTIAL ELECTRODES, TRANSDUCERS AND RECORDERS  
The electrode – electrolyte interface, Polarization, Ag/Agcl Electrodes, Body surface electrodes, Internal Electrodes. Transducers in general, Pressure Transducers, Temperature transducers, pulse sensors, Basic recording systems.  

UNIT-III  
MEDICAL IMAGING SYSTEMS  
Basics of medical imaging systems, block diagrams and applications of - X-ray machine, Computer Tomography, Magnetic Resonance Imaging systems, Ultrasonic Imaging systems.
UNIT-IV
MONITORING SYSTEMS
Basic principles of - Stethoscope, BP measuring Instrument, Electrocardiography(ECG), Electroencephalography(EEG) and Electromyography(EMG) recorders,

UNIT-V
SUPPORTING SYSTEMS
Basic principles of Pacemaker system, Transcutaneous Electrical Nerve stimulation (TENS), surgical diathermy, Heart lung machine, Hemo Dialysis, Lithotripsy.

TEXT BOOK(S)


REFERENCE BOOK(S)

Course Objectives
Develop ability to
1. Understand the mindset of the entrepreneurs.
2. Analyze the financial aspects of establishing an enterprise.
3. Learn entrepreneurial activities and determine strategies for launching.
4. Identify the challenges of entrepreneurship and develop an idea on the entrepreneurial framework.
5. Apply strategic perspectives in entrepreneurship.

Course Outcomes (COs)
At the end of the course, student would be able to
CO1. Explore and identify the entrepreneurial traits.
CO2. Identify various funding agencies and role of IPR.
CO3. Imagine and identify opportunities to launch new ventures.
CO4. Address entrepreneurial challenges.

UNIT-I
Introduction to entrepreneurship: meaning, importance, entrepreneurship characteristics, women entrepreneurs, classifications of entrepreneurs, myths of entrepreneurship, qualities of entrepreneurship, competencies, attitude function and nature of forms of entrepreneurship.

UNIT-II
Promotion and financial aspects of entrepreneurship: Idea generation- opportunities- SWOT analysis, patents and trademark, intellectual property rights, source of capital, debt capital, seed capital, venture capital- informal agencies in financing entrepreneurs. Government grants and subsidies, types of investors and private offerings.

UNIT-III
Launching entrepreneurial ventures: opportunities identification- entrepreneurial imagination and creativities – the nature of the creativity process innovation and entrepreneurial- methods to initiate venture creating, new ventures-acquiring and established entrepreneurial venture, franchising hybrid-disadvantage of franchising.

UNIT-IV
Legal challenges of entrepreneurship: Intellectual property protection patents, copy rights- trademarks and trade secret. Avoiding pitfalls-formulation of the entrepreneurial plan-the challenges of new venture startups-poor financial understanding-critical factors for new venture development, the evaluation process, feasibility criteria approach.
UNIT-V

**Strategic perspectives in entrepreneurship:** Strategic planning-strategic actions-strategic positioning-business stabilization-building the adoptive firms-understanding the growth stage unique managerial concern of growing ventures.

**TEXT BOOK(S)**


**REFERENCE BOOK(S)**

Prerequisite(s): None

Course Objectives
Develop ability
1. To understand the Fundamentals of Project Management and Financial considerations involved in it.
2. Estimate the slack-time and cost of the project.
3. Analyze the project risks.
4. Analyze the financial sources.
5. Configuring the venture capital sources.

Course outcomes (COs)
At the end of the course, student would be able to
CO1. Project Management process, project selection methods based on financial criteria.
CO2. Estimate project duration and completion time, estimate the cost and develop a project plan.
CO3. Risk management process.
CO4. Financing of project.
CO5. Concept of Venture capital.

UNIT – I

UNIT – II
Estimating times and cost: Factors influencing quality of estimates, estimation methods, types of cost, developing network, constructing project network, activity on node, network computation. PERT.

UNIT – III

UNIT – IV
Financing of Projects: Capital structure, methods of offering, equity capital, preference capital, debenture. Methods of offering term loans, working capital advances. Project financing structure.
UNIT – V

Financing infrastructure projects and Venture capital: Typical project configuration, key project parties. Project contracts, infrastructure financing scenario in India. Venture capital investor, venture capital investment, raising venture capital.

TEXT BOOK(S)

1. Project management- The managerial process, Clifford F Gray, Erik W Larsom, Gautam V. Desai, 4ed, THM.
2. Project- Planning, analysis, selection, financing, implementation and review, Prasanna Chandra, 6ed, TMH.
3. Project Management- Achieving competitive advantage, Jeffrey K Pinto, 1st ed, PHP.