ACADEMIC REGULATIONS, PROGRAM STRUCTURE AND DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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

<table>
<thead>
<tr>
<th>Section No.</th>
<th>Item</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Regulations for M.Tech Regular Students</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Institute and Department Vision and Mission</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>Program Educational Objectives and Program Outcomes</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td><strong>Program Structure</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.1 I Year I Semester</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>4.2 I Year II Semester</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>4.3 II Year I Semester</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>4.4 II Year II Semester</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td><strong>Detailed Syllabus</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.1 I Year I Semester</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>5.2 I Year II Semester</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>5.3 II Year I Semester</td>
<td>89</td>
</tr>
</tbody>
</table>
Academic Regulations of M.Tech (CSE) Programme (AR22)

(Effective for the students admitted into I year from the Academic Year 2022-23 and onwards)

1.0 Post-Graduate Degree Programme (PGP) in M.Tech Geethanjali College of Engineering and Technology offers Two-Year (Four-Semester) full-time Master of Technology (M.Tech) Degree Programme in Computer Science and Engineering, under Choice Based Credit System (CBCS).

2.0 Eligibility for Admissions

2.1 Admission to the PGP shall be made subject to eligibility, qualification and specializations prescribed by the GCET from time to time.

2.2 Admission to the post graduate programme shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GATE Examination / the merit rank obtained by the qualified student in an entrance test conducted by Telangana State Government (PGECET) for M.Tech programme / on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.3 The medium of instruction for the M.Tech Programme shall be ENGLISH only.

3.0 M.Tech Programme Structure

3.1 The M.Tech Programme is of Semester pattern, with Four Semesters consisting of Two academic years, each academic year having Two Semesters (First / Odd and Second / Even Semesters). Each Semester shall be of 20 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per Semester.

3.2 The two-year M.Tech. program consists of 68 credits and the student has to register for all 68 credits and earn all 68 credits for the award of M.Tech. degree. There is NO exemption of credits in any case.

3.3 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M.Tech degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M.Tech programme.

3.4 UGC / AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these PG academic regulations, as listed below:

3.4.1 Semester Scheme

Each Semester shall have 'Continuous Internal Evaluation (CIE)' and 'Semester End
Examination (SEE). Choice Based Credit System (CBCS) is taken as 'reference' for the present set of Regulations. The term 'COURSE' refers to 'Theory Course', or 'Lab Course', or 'Design / Drawing Course', or 'Seminar', or 'Project', as the case may be.

3.4.2 Credit Courses

All courses are to be registered by the student in a semester to earn credits which shall be assigned to each course in an L: P: C (Lecture Periods: Practical Periods: Credits) structure based on the following general pattern:

- One credit for one hour / week / semester for theory / lecture (L) courses
- One credit for two hours / week / semester for laboratory/ practical (P) courses
- Other student activities like study tour, guest lecture, conference/workshop participations, technical paper presentations, and Mandatory courses (Non credit Audit Courses), if any, shall not carry credits.

3.4.3 Course Classification

All courses offered for the Post-Graduate (M.Tech Degree) Programme are broadly classified as follows. GCET has followed in general the guidelines issued by AICTE / UGC.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Broad Course Classification</th>
<th>Course Group/ Category</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Core Courses (CoC)</td>
<td>PC- Professional Core</td>
<td>Includes courses related to the parent discipline/department/ branch of Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dissertation</td>
<td>M.Tech. Project or PG Project or Major Project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mini Project with Seminar</td>
<td>Seminar based on core contents related to Parent Discipline/ Department/ Branch of Engineering</td>
</tr>
<tr>
<td>2</td>
<td>Elective Courses (EIE)</td>
<td>PE- Professional Electives</td>
<td>Includes elective courses related to the parent discipline/department/ branch of Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OE- Open Electives</td>
<td>Elective courses which include inter-disciplinary courses or courses in an area outside the parent discipline/department/ branch of Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Mandatory Courses</td>
<td>--</td>
<td>Non-Credit Audit Courses</td>
</tr>
</tbody>
</table>

4.0 Course Registration

4.1 A ‘Faculty Advisor’ shall be assigned to the M.Tech. Programme, who will advise the Students about the M.Tech Course Structure and Curriculum, Choice/ Option for Courses, based on the competence, progress, pre-requisites and interest of the
students.

4.2 The Academic department of the College offering the programme invites ‘Registration Forms’ from students within 15 days from the commencement of class work. The Registration Requests for any ‘SEMESTER’ shall be completed BEFORE the commencement of SEEs of ‘PRECEDING SEMESTER’.

4.3 A Student can apply for Registration, ONLY AFTER obtaining the ‘WRITTEN APPROVAL’ from his Faculty Advisor, which should be submitted to the department.

4.4 If the Student submits ambiguous choices or multiple options or erroneous entries during Registration for the Course(s) under a given / specified Course Group / Category as listed in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.

4.5 Course Options exercised through Registration are final and CANNOT be changed, nor can they be interchanged; further, alternate choices also will not be considered. However, if the Course that has already been listed for Registration by GCET in a Semester could not be offered due to unforeseen or unexpected reasons, then the Student will be allowed to have alternate choice either for a new course, if it is offered, or for another existing course (subject to availability of seats). Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5.0 Attendance Requirements

The programmes are offered on the basis of a unit system with each course being considered a unit. Attendance is calculated separately for each Course.

5.1 Attendance in all classes (Lectures / Laboratories / audit courses) is compulsory. The minimum required attendance in each course including the attendance of mid-term examination / Laboratory etc. is 75%. Two periods of attendance for each theory course shall be considered, if the student appears for the mid-term examination of that course. A student shall not be permitted to appear for the SEE, if his attendance is less than 75%.

5.2 A student’s seminar report and seminar presentation in Mini Project shall be eligible for evaluation, only if he ensures a minimum of 75% of his attendance in seminar presentation classes in Mini Project during that semester.

5.3 Condoning of shortage of attendance (between 65% and 75%) up to a maximum of 10% in each course of a semester shall be granted by the College.
Academic Committee on genuine reasons.

5.4 A prescribed fee per course shall be payable for condoning shortage of attendance. after getting the approval of College Academic Committee for the same. The College Academic Committee shall maintain relevant documents along with the request from the student.

5.5 Shortage of attendance below 65% in any course shall in ‘NO’ case be condoned.

5.6 A Student, whose shortage of attendance is not condoned in any course(s) (Theory/Lab/Mini Project with Seminar) in any semester, is considered detained in that course(s) and is not eligible to write Semester End Examination(s) (in case of Mini Project with Seminar, his/her Mini Project with Seminar Report or Presentation are not eligible for evaluation) of such course(s) in that semester, and he has to seek re-registration for those course(s) in subsequent semesters, and attend the same as and when offered.

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

5.8 a) A student shall put in a minimum required attendance in at least three theory courses (excluding mandatory (non-credit audit) course) in I Year I semester for promotion to I Year II Semester.

b) A student shall put in a minimum required attendance in at least three theory courses (excluding mandatory (non-credit audit) course) in I Year II semester for promotion to II Year I Semester.

6.0 Academic Requirements
The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in section 5. The performance of the student in each semester shall be evaluated course-wise, with a maximum of 100 marks per course (theory / practical), on the basis of CIE and SEE.

6.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if he secures not less than

- 40% of Marks (24 out of 60 marks) in the Semester End Examination;
- 40% of Marks (Average of 10 out of 25 marks) from two mid-term examinations;
- 40% of Marks in the internal examinations (16 out of 40 marks allotted for CIE); and
6.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini Project with seminar, if student secures not less than 50% marks (i.e. 50 out of 100 allotted marks). The student would be treated as failed, if student (i) does not submit a seminar report on Mini Project or does not make a presentation of the same before the evaluation committee as per schedule or (ii) secures less than 50% marks in Mini Project with seminar evaluation. The failed student shall reappear for the above evaluation when the notification for supplementary examination is issued.

6.3 A student shall register for all courses for a total of 68 credits as specified and listed in the Programme structure, put in required attendance and fulfill the academic requirements for securing 68 credits, obtaining a minimum of ‘B’ Grade or above in each course, and all 68 credits securing Semester Grade Point Average (SGPA) ≥ 6.0 (in each semester) and final Cumulative Grade Point Average (CGPA) (i.e., CGPA at the end of PGP) ≥ 6.0, and shall **pass all the mandatory audit courses** to complete the PGP successfully.

**Note:**
(1) The SGPA shall be computed and printed on the memorandum of grades only if the student passes all the courses offered and gets a minimum B grade in all the courses.

(2) CGPA is calculated only when the student passes in all the courses offered in all the semesters.

6.4 Marks and Letter Grades obtained in all those courses covering the above specified 68 credits alone shall be considered for the calculation of final CGPA, which will be indicated in the Grade Card /Marks Memo of second year second semester.

6.5 If a student registers for extra course(s) (in the parent department or other departments/branches of Engineering) other than those listed courses totaling to 68 credits as specified in the programme structure, the performance in extra course(s) (although evaluated and graded using the same procedure as that of the required 68 credits) shall not be taken into account while calculating the SGPA and CGPA.

For such extra course(s) registered, percentage of marks and Letter Grade alone shall be indicated in the Grade Card, as a performance measure, subject to completion of the attendance and academic requirements as stated in sections 5 and 6.1 - 6.3.

6.6 When a student is detained due to shortage of attendance in any course(s) in any
semester, no Grade allotment shall be made for such course(s). However, he is eligible for re-registration of such course(s) in the subsequent semester(s), as and when next offered, with the academic regulations of the batch into which he is re-registered, by paying the prescribed fees per course. In all these re-registration cases, the student shall have to secure a fresh set of internal marks and Semester End Examination marks for performance evaluation in such course(s), and SGPA / CGPA calculations.

6.7 A student eligible to appear for the Semester End Examination in any course, but absent from it or failed (failing to secure ‘B’ Grade or above), may reappear for that course at the supplementary examination as and when conducted. In such cases, his Internal Marks assessed earlier for that course will be carried over, and added to the marks secured in the supplementary examination, for the purpose of evaluating his performance in that course.

6.8 A Student who fails to earn 68 credits as per the specified programme structure, and as indicated above, within four academic years from the date of commencement of his first year first semester, shall forfeit his seat in M.Tech programme and his admission shall stand cancelled.

7.0 Evaluation - Distribution and Weightage of Marks
The performance of a student in each semester shall be evaluated course-wise (irrespective of credits assigned) for a maximum of 100 marks.

7.1 The performance of a student in every course (including practicals and Project) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination). The Continuous Internal Evaluation shall be made based on the average of the marks secured in the two Mid-Term Examinations conducted, first Mid-Term examinations in the middle of the Semester and second Mid-Term examinations during the last week of instruction.

7.2 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.

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. Student shall have to earn 40%, i.e 10 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:

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

The student has to get minimum of 40% of Marks in the internal examinations (16 out of 40 marks allotted for CIE).

While the first mid-term examination shall be conducted on 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 subject 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 concerned course for 10 marks before II Mid-Term Examination.

The details of the end semester question paper pattern are as follows:

7.3 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.
7.4 For practical courses there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

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.

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

7.5 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.

7.6 There shall be Mini Project with Seminar during I year II semester for internal evaluation of 100 marks. The Departmental Academic Committee (DAC) will review the progress of the mini project during the seminar presentations and evaluate the same for 50 marks. Mini Project Viva Voce will be evaluated by the DAC for another 50 marks before the semester end examinations. Student shall carryout the mini project in consultation with the mini project supervisor which may include critically reviewing the literature, project implementation and submit it to the department in the
form of a report and shall make an oral presentation before the DAC consisting of Head of the Department, Mini Project supervisor and two other senior faculty members of the department. The student has to secure a minimum of 50% of marks in i) seminar presentation and ii) mini project viva voce, to be declared successful. If he fails to obtain the minimum marks, he has to reappear for the same as and when scheduled.

7.7 Every student shall be required to submit a thesis or dissertation on a topic approved by the Dissertation Review Committee (DRC).

7.8 DRC shall be constituted with the Head of the Department as Chairperson, Dissertation Supervisor and one senior faculty member of the Department offering the M. Tech programme.

7.9 Registration of Dissertation Work: A student is permitted to register for the Dissertation work after satisfying the attendance requirement in all the courses, both theory and practicals up to I year M. Tech II Semester.

7.10 After satisfying 7.9, a student must present in Dissertation Work Review-I, in consultation with his Dissertation Supervisor: the title, objective, and plan of action of his Dissertation work to the DRC for approval within four weeks from the commencement of Second year First Semester. Only after obtaining the approval of the DRC, the student shall initiate the Dissertation work.

7.11 If a student wishes to change his supervisor or topic of the dissertation, he can do so with the approval of the DRC. However, the DRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of dissertation proposal. If yes, his date of registration for the dissertation work starts from the date of change of Supervisor or topic as the case may be.

7.12 A student shall submit his dissertation progress report in two stages at least with a gap of three months between them.
The work on the dissertation shall be initiated at the beginning of the II year and the duration of the dissertation is two semesters. A student is permitted to submit Dissertation Thesis only after successful completion of all theory and practical courses with the approval of DRC not earlier than 40 weeks from the date of approval of the dissertation work. For the approval of DRC the student shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the DRC.

The Dissertation Work Review II (Project / Dissertation Phase-I) in II Year I Semester carries internal marks of 100. Evaluation shall be done by the DRC for 50 marks and the Supervisor shall evaluate the work for the other 50 marks. The Supervisor and DRC shall examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Dissertation Work. A student has to secure a minimum of 50% of marks to be declared successful in Dissertation Work Review II. If he fails to obtain the minimum required marks, he has to reappear for Dissertation Work Review-II as and when conducted.

The Dissertation Work Review III (Project / Dissertation Phase-II) in II Year II Semester carries 40 internal marks. Evaluation should be done by the DRC for 20 marks and the Supervisor shall evaluate the work for the other 20 marks. The DRC shall examine the overall progress of the Dissertation Work and decide whether or not the Dissertation is eligible for final submission. A student has to secure a minimum of 50% of marks to be declared successful in Dissertation Work Review III. If he fails to obtain the required minimum marks, he has to reappear for Dissertation Work Review III as and when conducted. For final Dissertation Evaluation (Viva Voce) in II Year II Semester shall be evaluated by an External Examiner, appointed by Principal of the college, for 60 marks. The student has to secure a minimum of 50% marks in Project Evaluation (Viva-Voce) examination.

Dissertation Work Reviews - II and III shall be conducted in phase I (Regular) and Phase II (Supplementary). Phase II shall be conducted only for unsuccessful students in Phase I. The unsuccessful students in Dissertation Work Review - II (Phase II) shall reappear for the same at the time of Dissertation Work Review - III (Phase I). These students shall reappear for Dissertation Work Review - III in the next academic year at the time of Dissertation Work Review – II, only after completion of Dissertation Work Review - II, and subsequently, Dissertation Work Review - III follows. The unsuccessful students in Dissertation Work Review - III (Phase II) shall
reappear for the same in the next academic year only at the time of Dissertation Work Review - II (Phase I).

7.17 After approval from the DRC, a soft copy of the thesis should be submitted for ANTI-PLAGIARISM check and the plagiarism report should be submitted to the Examination Branch and be included in the final thesis. The Thesis will be accepted for submission, if the similarity index is less than 30%. If the similarity index has more than the required percentage, the student is advised to modify accordingly and resubmit the soft copy of the thesis after one month. The maximum number of re-submissions of thesis after plagiarism check is limited to TWO. The candidate has to register for the Dissertation work and work for two semesters. After three attempts, the admission is liable to be cancelled. The college authorities are advised to make plagiarism check of every soft copy of theses before submissions.

7.18 Three copies of the Dissertation certified by the supervisor shall be submitted to the Department, after submission of a research paper related to the Dissertation work in a UGC approved journal. A copy of the submitted research paper shall be attached to the thesis.

7.19 The Dissertation thesis shall be adjudicated by an external examiner appointed by Chief Controller of Examinations. The Supervisor in association with the Head of the Department provides a panel of three examiners, from which the Chief Controller of Examinations shall select one of the three examiners.

7.20 If the report of external examiner is unsatisfactory, the student shall revise and resubmit the dissertation. If the report of external examiner is unsatisfactory again, the dissertation shall be rejected. Subsequent actions for such dissertation may be considered, only on the specific recommendations of the external examiner and DRC. No further correspondence in this matter will be entertained, if there is no specific recommendation for resubmission.

7.21 If the report of the external examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Dissertation Viva-Voce examination. The Dissertation Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the thesis. The student has to secure a minimum of 50% of marks in dissertation Evaluation (Viva-Voce) examination.

7.22 If he fails to fulfill the requirements as specified in 7.21, he shall reappear for the Viva-Voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he shall not be eligible for the award of the
degree, unless he is asked to revise and resubmit his dissertation work by the board within a specified time period (within four years from the date of commencement of his first year first semester).

7.23 The Dissertation Viva-Voce External examination marks must be submitted to the Examination Branch on the day of the examination.

7.24 For mandatory non-credit Audit courses, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. These marks should be submitted to Examination Branch along with the internal marks of other courses.

7.25 No marks or letter grades shall be allotted for mandatory non-credit Audit Courses. Only Pass/Fail shall be indicated in Grade Card.

8.0 Re-Admission / Re-Registration

8.1 Re-Admission for Discontinued Student

A student, who has discontinued the M.Tech degree programme due to any reason whatsoever, may be considered for 'readmission' into the same degree programme (with the same specialization) with the academic regulations of the batch into which he gets readmitted, with prior permission from the authorities concerned, subject to sections 3.2 and 6.6.

8.2 If a student is detained in a course(s) due to shortage of attendance in any semester, he may be permitted to re-register for the same course(s) in the same category (core or elective group) or equivalent course, if the same course is not available, as suggested by the Board of Studies of that department, as and when offered in the subsequent semester(s), with the academic regulations of the batch into which he seeks re-registration, with prior permission from the authorities concerned, subject to condition specified in section 3.2.

8.3 A student shall be given one chance to re-register and attend the classes for a maximum of two courses, if the internal marks secured by a student are less than 50% and failed in those courses. A student must re-register for failed courses within four weeks of commencement of the class work and secure the required minimum attendance. In the event of the student exercising this choice, his CIE (internal) marks and SEE marks obtained in the previous attempt stand cancelled.

9.0 Examinations and Assessment - The Grading System

9.1 Grades shall be awarded to indicate the performance of each student in each Theory Course, or Lab / Practicals, or Mini Project with Seminar, or Dissertation, etc., based on the % of marks obtained in CIE + SEE (both taken together) as specified in Section
As a measure of the student’s performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed:

<table>
<thead>
<tr>
<th>% of Marks Secured in a subject/Course (Class Intervals)</th>
<th>Letter Grade (UGC Guidelines)</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% and above (≥ 90%, ≤ 100%)</td>
<td>O (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>Below 90% but not less than 80%</td>
<td>A⁺ (Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>Below 80% but not less than 70%</td>
<td>A (Very Good)</td>
<td>8</td>
</tr>
<tr>
<td>Below 70% but not less than 60%</td>
<td>B⁺ (Good)</td>
<td>7</td>
</tr>
<tr>
<td>Below 60% but not less than 50%</td>
<td>B (above Average)</td>
<td>6</td>
</tr>
<tr>
<td>Below 50% (≤ 50%)</td>
<td>F (FAIL)</td>
<td>0</td>
</tr>
</tbody>
</table>

9.3 A student obtaining F Grade in any Course is deemed to have ‘failed’ and is required to reappear as ‘Supplementary Student’ for the SEE, as and when conducted. In such cases, his CIE (Internal) Marks in those courses shall remain as obtained earlier.

9.4 If a student has not appeared for the examinations, ‘Ab’ Grade shall be allocated to him for any course and shall be considered ‘failed’ and shall be required to reappear as ‘Supplementary Student’ for the SEE, as and when conducted.

9.5 A Letter Grade does not imply any specific marks percentage; it is only the range of percentage of marks.

9.6 In general, a student shall not be permitted to repeat any Course(s) only for the sake of ‘Grade Improvement’ or ‘SGPA / CGPA Improvement’.

9.7 A student earns Grade Point (GP) in each Course, on the basis of the Letter Grade obtained by him in that Course. The corresponding ‘Credit Points’ (CP) are computed by multiplying the Grade Point with Credits for that particular Course.

**Credit Points (CP) = Grade Point (GP) x Credits .... For a Course**

9.8 The student passes the Course only when he gets GP ≥ 6 (B Grade or above).

9.9 The SGPA is calculated by dividing the Sum of Credit Points (ΣCP) secured from
ALL Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

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

where ‘i’ is the course indicator index (taking into account all Courses in a Semester), ‘N’ is the no. of Courses ‘REGISTERED’ for the Semester (as specifically required and listed under the Course Structure of the parent Department), \(C_i\) is the no. of Credits allotted to the \(i^{th}\) Course, and \(G_i\) represents the GP corresponding to the Letter Grade awarded for that \(i^{th}\) Course.

9.10 The CGPA is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

\[ \text{CGPA} = \frac{\sum_{j=1}^{M} C_j G_j}{\sum_{j=1}^{M} C_j} \] ... for all S Semesters registered (ie., upto and inclusive of S Semesters, \(S \geq 2\)),

where ‘M’ is the TOTAL no. of Courses (as specifically required and listed under the Course Structure of the parent Department) the Student has ‘REGISTERED’ for from the 1\(^{st}\) Semester onwards up to and inclusive of the Semester S ( obviously M > N ), ‘j’ is the Course indicator index (taking into account all Courses from 1 to S Semesters), \(C_j\) is the no. of Credits allotted to the \(j^{th}\) Course, and \(G_j\) represents the Grade Points (GP) corresponding to the Letter Grade awarded for that \(j^{th}\) Course. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.
Illustration of calculation of SGPA

<table>
<thead>
<tr>
<th>Course/Subject</th>
<th>Credits</th>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4*8 = 32</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4*10 = 40</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>4*6 = 24</td>
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<tr>
<td>Course 4</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3*6 = 18</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>A+</td>
<td>9</td>
<td>3*9 = 27</td>
</tr>
<tr>
<td>Course 6</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3*6 = 18</td>
</tr>
</tbody>
</table>

SGPA = 159/21 = 7.57

Illustration of calculation of CGPA

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
<th>SGPA</th>
<th>Credits * SGPA</th>
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<tbody>
<tr>
<td>Semester I</td>
<td>24</td>
<td>7</td>
<td>24*7 = 168</td>
</tr>
<tr>
<td>Semester II</td>
<td>24</td>
<td>6</td>
<td>24*6 = 144</td>
</tr>
<tr>
<td>Semester III</td>
<td>24</td>
<td>6.5</td>
<td>24*6.5 = 156</td>
</tr>
<tr>
<td>Semester IV</td>
<td>24</td>
<td>6</td>
<td>24*6 = 144</td>
</tr>
</tbody>
</table>

CGPA = 612/96 = 6.37

10.0 Award of Degree and Class

10.1 If a student who registers for all the specified Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme, and secures the required number of 68 Credits (with CGPA ≥ 6.0), shall be declared to have ‘QUALIFIED’ for the award of the M.Tech Degree in Computer Science and Engineering that he was admitted into.

10.2 Award of Class

After a student has earned the requirements prescribed for the completion of the programme and is eligible for the award of M.Tech Degree, he shall be placed in one of the following three classes based on the CGPA:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>≥ 7.75</td>
</tr>
<tr>
<td>First Class</td>
<td>6.75 ≤ CGPA &lt; 7.75</td>
</tr>
<tr>
<td>Second Class</td>
<td>6.00 ≤ CGPA &lt; 6.75</td>
</tr>
</tbody>
</table>

A student with final CGPA (at the end of the PGP) < 6.00 shall not be eligible for the Award of Degree.
11.0 Withholding of Results
If the student has not paid the dues, if any, to the GCET or if any case of indiscipline
is pending against him, the result and degree of the student shall be withheld and he
shall not be allowed into the next semester.

12.0 General
12.1 Credit: A unit by which the course work is measured. It determines the number of
hours of instructions required per week. One credit is equivalent to one hour of
teaching (lecture or tutorial) or two hours of practical work / field work per week.

12.2 Credit Point: It is the product of grade point and number of credits for a course.

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

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

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

12.6 GCET may change or amend the academic regulations or syllabi at any time and the
changes or amendments made shall be applicable to all the students with effect from
the dates notified by GCET.
# PUNISHMENT FOR MALPRACTICE

<table>
<thead>
<tr>
<th>Nature of Malpractices</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1 (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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>1 (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that 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>2 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>3 Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the 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 handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td></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>---</td>
</tr>
<tr>
<td>5</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td>6</td>
<td>Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any 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>7</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>---</td>
<td>---</td>
</tr>
<tr>
<td>8</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td>10</td>
<td>Comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
<tr>
<td></td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the chief controller of examinations for further action to award suitable punishment.</td>
</tr>
</tbody>
</table>

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.TECH. PROGRAM IN 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
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 center 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 rapidly changing field as a competent computer science engineer.
3. To prepare graduates capable in all phases of software development, possess a firm understanding of hardware technologies, have the strong mathematical background necessary for scientific computing, be sufficiently well versed in general theory and practice to allow growth within the discipline as it advances.
4. To prepare graduates to assume leadership roles by possessing good communication skills, ability to work effectively as team members, appreciation for their social and ethical responsibility in a global setting.
PROGRAM EDUCATION OBJECTIVES (PEOs)

PEO-I: Perform with dominance in scholastics, business, design and development in computing technology, or exploration in a specific area of Computer Science and Engineering to pursue research and an appreciation for lifelong learning.

PEO-II: Demonstrate methodically scientific concepts and problem solving skills by applying research principles for effective decision making in handling real life problems within realistic constraints.

PEO-III: Ability to convey the scientific exploration or express inventive thoughts in a powerful way with familiarity, social and economic obligation with the support of domain expertise.

PROGRAM OUTCOMES (Pos)

Students would be able to:

<table>
<thead>
<tr>
<th>PO</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>PO 1</td>
<td>Apply knowledge of recent computing technologies, skills and current tools of computer science and engineering.</td>
</tr>
<tr>
<td>PO 2</td>
<td>Design and conduct experiments, as well as to analyze and interpret data.</td>
</tr>
<tr>
<td>PO 3</td>
<td>Apply knowledge of contemporary research issues in the different areas of computer science &amp; engineering</td>
</tr>
<tr>
<td>PO 4</td>
<td>Explore research gaps, analyze and carry out research in the specialized/emerging areas of computer science and engineering.</td>
</tr>
<tr>
<td>PO 5</td>
<td>Design software systems, components, or processes to meet identified needs within economic, environmental and social constraints.</td>
</tr>
<tr>
<td>PO 6</td>
<td>Express/present ideas in an impressive and professional manner.</td>
</tr>
<tr>
<td>PO 7</td>
<td>Recognize the need to engage in lifelong learning through continuing education and research.</td>
</tr>
<tr>
<td>PO 8</td>
<td>Work in multidisciplinary and multicultural environment.</td>
</tr>
<tr>
<td>PO 9</td>
<td>Become entrepreneur based upon societal needs.</td>
</tr>
<tr>
<td>PO 10</td>
<td>Exhibit professional, social and ethical responsibilities.</td>
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<tr>
<td>S.No</td>
<td>Course Code</td>
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<tr>
<td>1.</td>
<td>20MCS102</td>
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<td>20MCS103</td>
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<td>3.</td>
<td><strong>Program Specific Elective - I</strong>&lt;br&gt;20MCS104 Machine Learning&lt;br&gt;20MCS105 Cryptography &amp; Network Security&lt;br&gt;20MCS106 Internet of Things&lt;br&gt;20MCS107 Advanced Computer Networks</td>
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<td>4.</td>
<td><strong>Program Specific Elective - II</strong>&lt;br&gt;20MCS108 Software Architectures&lt;br&gt;20MCS109 Information Retrieval Systems&lt;br&gt;20MCS110 Distributed Systems&lt;br&gt;20MCS111 Mobile Application Development</td>
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<tr>
<td>5.</td>
<td>20MCS1L1</td>
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<td>6.</td>
<td><strong>Based on Program Specific Elective-I</strong>&lt;br&gt;20MCS1L2 Machine Learning Lab&lt;br&gt;20MCS1L3 Cryptography &amp; Network Security Lab&lt;br&gt;20MCS1L4 Internet of Things Lab&lt;br&gt;20MCS1L5 Advanced Computer Networks Lab</td>
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<td>7.</td>
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<td>8.</td>
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<td><strong>Total</strong></td>
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</tr>
<tr>
<td><strong>Total Periods Per Week</strong></td>
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</tr>
</tbody>
</table>
### FIRST YEAR SEMESTER-II

<table>
<thead>
<tr>
<th>S.No</th>
<th>Course Code</th>
<th>Subject</th>
<th>Category</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>CIE</th>
<th>SEE</th>
<th>Total</th>
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<tbody>
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<td>20MCS202</td>
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<td>PC3</td>
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<td>-</td>
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<td>40</td>
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<td>-</td>
<td>-</td>
<td>40</td>
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<td>20MCS208</td>
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<td>20MCS210</td>
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<td>7.</td>
<td>20MCS201</td>
<td>MINI PROJECT with Seminar</td>
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Total Periods Per Week: 26
## SECOND YEAR SEMESTER-I

<table>
<thead>
<tr>
<th>S.No</th>
<th>Course Code</th>
<th>Subject</th>
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<th>L</th>
<th>T</th>
<th>P</th>
<th>CIE</th>
<th>SEE</th>
<th>Total</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1.</td>
<td>Program Specific Elective - V</td>
<td>20MCS302 Optimization Techniques</td>
<td>PSE V</td>
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<td>20MCS303 High Performance Computing</td>
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<td>20MCS304 Ad hoc and Sensor Networks</td>
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<td>20MCS305 Social, Web and Mobile Analytics</td>
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<td>20MOE302 Industrial Safety</td>
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## SECOND YEAR SEMESTER-II

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Prerequisites
1. A course on “Data Structures”

Course Objectives:
1. Introduces the heap data structures such as leftist heaps, binomial heaps, fibonacci and
   min-max heaps
2. Introduces a variety of data structures such as disjoint sets, hash tables, search
   structures and digital search structures

Course Outcomes:
1. Ability to select the data structures that efficiently model the information in a problem
2. Ability to understand how the choice of data structures impact the performance of
   programs
3. Can Design programs using a variety of data structures, including hash tables, search
   structures and digital search structures

UNIT - I
Heap Structures - Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, 
Fibonacci heaps.

UNIT - II
Hashing and Collisions - Introduction, Hash Tables, Hash Functions, different
Hash Functions: Division Method, Multiplication Method, Mid-Square Method, Folding
Method, Collisions

UNIT - III
Search Structures - OBST, AVL trees, Red-Black trees, Splay trees,
Multiway Search Trees - B-trees, 2-3 trees

UNIT - IV
Digital Search Structures
Digital Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees, Standard Tries,
Compressed Tries

UNIT - V
Pattern matching Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-
Pratt algorithm, Naïve String, Harspool, Rabin Karp

Textbooks:
1. Fundamentals of data structures in C++ Sahni, Horowitz, Meatha, Universities
   Press. Introduction to Algorithms, TH Cormen, PHI
References:
1. Design methods and analysis of Algorithms, SK Basu, PHI.
20MCS103 - MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
M.Tech. CSE I Year, I Semester

Pre-requisites:
1. No prerequisites
2. An understanding of Mathematics in general is sufficient.

Course Objectives:
1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:
1. Ability to understand and construct precise mathematical proofs
2. Ability to use logic and set theory to formulate precise statements
3. Ability to analyze and solve counting problems on finite and discrete structures
4. Ability to describe and manipulate sequences
5. Ability to apply graph theory in solving computing problems

UNIT - I
The Foundations: Logic and Proofs
Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II
Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations
Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III
Algorithms, Induction and Recursion
Induction and Recursion
Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT - IV
Discrete Probability and Advanced Counting Techniques
An Introduction to Discrete Probability. Probability Theory, Bayes’ Theorem, Expected Value and Variance.
Advanced Counting Techniques
Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of
UNIT - V
Graphs
Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees
Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Textbook:

References:
20MCS104- MACHINE LEARNING

M.Tech. CSE I Year, I Semester

Pre-requisites:
1. A Course on "Data Structures" Knowledge on statistical methods

Course Objectives:
1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

Course Outcomes:
1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT - I
Introduction
Well-posed learning problems, designing a learning system Perspectives and issues in machine learning

Concept learning and the general to specific ordering
Introduction, A concept learning task, concept learning as search, Find -S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.

Decision Tree Learning
Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT - II
Artificial Neural Networks: Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm. Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition


UNIT - III
Bayesian learning
Introduction, Bayes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle , Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief
Networks, EM Algorithm.

**Computational Learning Theory**

**Instance-Based Learning**
Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

**UNIT - IV**

**Pattern Comparison Techniques**
Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

**Pattern Classification**

**UNIT – V**

**Analytical Learning:** Introduction, Learning with Perfect Domain Theories: PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

**Combining Inductive and Analytical Learning**
Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

**Textbooks:**
1. Machine Learning – Tom M.Mitchell,-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

**References:**
M.Tech. CSE AR22 Regulations

GEETHANJ Ali COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
CHEERYAL (V), KEESARA (M), MEDCHAL DIST., TELANGANA-501301

20MCS105 - CRYPTOGRAPHY & NETWORK SECURITY
M.Tech. CSE I Year, I Semester

Prerequisites:
1. A Course on “Computer Networks”

Course Objectives:
1. To impart knowledge on network security issues, services, goals and mechanisms.
2. To analyze the security of communication systems, networks and protocols.
3. To apply algorithms used for secure transactions in real world applications

Course Outcomes:
1. Demonstrate the knowledge of cryptography and network security concepts and applications.
2. Ability to apply security principles in system design.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT - I

UNIT - II
Conventional Encryption - Principles, Conventional encryption algorithms (DES, AES, RC4, Blowfish), cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT - III
Number Theory - Modular Arithmetic, Euclid’s Algorithm, Fermat’s and Euler’s Theorem, Chinese Remainder Theorem, Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT - IV
Email privacy - Pretty Good Privacy (PGP) and S/MIME.

UNIT - V
Web Security - Requirements, Secure Socket Layer (SSL) and Transport Layer Security(TLS), Secure Electronic Transaction (SET).

Department of Computer Science and Engineering 34
Textbooks:

Reference:
Prerequisites: NIL

Course Objectives:
1. To introduce the terminology, technology and its applications
2. To introduce the raspberry PI platform, that is widely used in IoT applications
3. To introduce the implementation of web based services on IoT devices

Course Outcomes:
1. Understand the new computing technologies
2. Able to apply the latest computing technologies like cloud computing technology and Big Data
3. Ability to introduce the concept of M2M (machine to machine) with necessary protocols
4. Get the skill to program using python scripting language which is used in many IoT devices

UNIT – I

UNIT - II
IoT and M2M Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG-NETCONF, YANG, SNMP NETOPEER

UNIT - III
Introduction to Python Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV
IoT Physical Devices and Endpoints Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.
UNIT - V
IoT Physical Servers and Cloud Offerings
Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Textbooks:
M.Tech. CSE

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20MCS107 - ADVANCED COMPUTER NETWORKS
M.Tech. CSE I Year, I Semester

Prerequisites:
1. Data Communication, Basic Networking Principles

Course Objective:
1. This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

Course Outcomes:
1. Understanding of holistic approach to computer networking
2. Ability to understand the computer networks and their application
3. Ability to design simulation concepts related to packet forwarding in networks

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
UNIT – V
Creating simulated networks and passing packets through them using different routing techniques. Installing and using network monitoring tools.

Textbooks:

References:
20MCS108 - SOFTWARE ARCHITECTURES

M.Tech. CSE I Year, I Semester

Pre Requisite:
1. A course on “Software Engineering”

Course Objectives:
1. To understand the concept of software architecture
2. To understand the design, documentation of software Architecture and Reconstruct.
3. To understand importance of Architecture Evaluation and Methods.
4. To understand reusability of Architecture

Course Outcomes:
1. Students can Design, document and Reconstruct Software Architecture
2. Students have profound knowledge on Software Architecture
3. Students can evaluate Architecture
4. Students can reuse the Architecture

UNIT - I
Envisioning Architecture

UNIT - II
Creating an Architecture
Understanding Quality Attributes, Achieving qualities, Architectural styles and patterns Air Traffic Control – a case study in designing for high availability

UNIT – III
Designing the Architecture
Documenting software architectures, Reconstructing Software architecture Flight Simulation – a case study in Architecture for Integrability

UNIT – IV
Analyzing Architectures
Architecture Evaluation, Architecture design decision making, ATAM, CBAM. The Nightingale System - a case study in Applying the ATAM The NASA ECS Project – a case study in Applying the CBAM

UNIT – V
Moving from one system to many
Software Product Lines, Building systems from off the shelf components, Software architecture in future. Celsius Tech – a case study in product line development
Textbook:

References:
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
Prerequisites:
1. A Course on “Data Structures”

Course Objectives:
1. To learn the important concepts and algorithms in IRS
2. To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:
1. Ability to apply IR principles to locate relevant information large collections of data
2. Ability to design different document clustering algorithms
3. Implement retrieval systems for web search tasks.

UNIT - I
Introduction: Motivation, Basic Concepts, Past-Present and Future, the Retrieval Process

UNIT - II
Retrieval Evaluation: Introduction, retrieval Performance Evaluation, Reference Collections
Query languages: Introduction, Keyword-Based Querying, Pattern Matching, Structural Queries, Query Protocols
Query Operations: Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic global Analysis

UNIT - III
Indexing and Searching: Introduction, Inverted Files, Other Indices for Text, Boolean queries, Sequential Searching, pattern Matching, Structural Queries, Compression Searching the Web
Introduction, Challenges, Characterizing the Web, Search Engines, Browsing, Metasearches, Finding the Needle in the Haystack, Searching using Hyperlinks

UNIT - IV
User Interfaces and Visualization
UNIT - V
Multimedia IR: Models and Languages
Introduction, Data Modeling, Query Languages
Multimedia IR: Indexing and Searching

Textbook:
1. Modern Information Retrieval By Yates and Neto Pearson Education.

References:
Prerequisites:
1. A course on “Operating Systems”
2. A course on “Computer Networks”

Course Objectives:
1. This course provides an insight into Distributed systems.
2. Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

Course Outcomes:
1. Ability to understand Transactions and Concurrency control.
2. Ability to understand Security issues.
3. Understanding Distributed shared memory.
4. Ability to design distributed systems for basic level applications.

UNIT - I
Characterization of Distributed Systems
Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models-Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT - II
Operating System Support
Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture
Case study
SUN network file systems.
Name Services
Introduction, Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service.

UNIT - III
Peer to Peer Systems
Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, OceanStore.
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
UNIT - IV
Transactions and Concurrency control
Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions
Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery

Replication
Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT - V
Security
Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures

Case studies
Kerberos, TLS, 802.11 WiFi.

Textbooks:

References:
Prerequisites:
1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives:
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:
1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications.

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 units
Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle 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, reading 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 editing data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

Textbooks:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

Reference:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
Prerequisites:
1. A course on Computer Programming & Data Structures

Course Objectives:
1. Introduces the basic concepts of Abstract Data Types.
2. Reviews basic data structures such as stacks and queues.
3. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs, and B-trees.
4. Introduces sorting and pattern matching algorithms

Course Outcomes:
1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.

List of Programs
1. Write a program to perform the following operations:
   a. Insert an element into a binary search tree.
   b. Delete an element from a binary search tree.
   c. Search for a key element in a binary search tree.
2. Write a program for implementing the following sorting methods:
   a. Merge sort
   b. Heap sort
   c. Quick sort
3. Write a program to perform the following operations:
   a. Insert an element into a B-tree.
   b. Delete an element from a B-tree.
   c. Search for a key element in a B-tree.
4. Write a program to perform the following operations:
   a. Insert an element into a Min-Max heap
   b. Delete an element from a Min-Max heap
   c. Search for a key element in a Min-Max heap
5. Write a program to perform the following operations:
   a. Insert an element into a Leftist tree
   b. Delete an element from a Leftist tree
   c. Search for a key element in a Leftist tree
6. Write a program to perform the following operations:
   a. Insert an element into a binomial heap
   b. Delete an element from a binomial heap.
7. Write a program to perform the following operations:
   a. Insert an element into a AVL tree.
   b. Delete an element from a AVL search tree.
   c. Search for a key element in a AVL search tree.

8. Write a program to perform the following operations:
   a. Insert an element into a Red-Black tree.
   b. Delete an element from a Red-Black tree.
   c. Search for a key element in a Red-Black tree.

9. Write a program to implement all the functions of a dictionary using hashing.

10. Write a program for implementing Knuth-Morris-Pratt pattern matching algorithm.

11. Write a program for implementing Brute Force pattern matching algorithm.

12. Write a program for implementing Boyer pattern matching algorithm.

Textbooks:

References:
1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
M.Tech. CSE

M.Tech. CSE I Year, I Semester

Course Objectives:
1. To get an overview of the various machine learning techniques.
2. Understand complexity of Machine Learning algorithms and their limitations;

Course Outcomes:
1. Understand modern notions in data analysis oriented computing;
2. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
3. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments
1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday?
2. Extract the data from database.
3. Implement k-nearest neighbours classification.
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3 centroids)

<table>
<thead>
<tr>
<th>VAR1</th>
<th>VAR2</th>
<th>CLASS</th>
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<tr>
<td>1.713</td>
<td>1.586</td>
<td>0</td>
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<td>0.180</td>
<td>1.786</td>
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<td>0.353</td>
<td>1.240</td>
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<td>0.940</td>
<td>1.566</td>
<td>0</td>
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<tr>
<td>1.486</td>
<td>0.759</td>
<td>1</td>
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<tr>
<td>1.266</td>
<td>1.106</td>
<td>0</td>
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<tr>
<td>1.540</td>
<td>0.419</td>
<td>1</td>
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<tr>
<td>0.459</td>
<td>1.799</td>
<td>1</td>
</tr>
<tr>
<td>0.773</td>
<td>0.186</td>
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</tr>
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</table>

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

<table>
<thead>
<tr>
<th>medium skiing design single twenties no</th>
<th>high golf trading married fortiesss yes</th>
<th>low speedway transport married thirtiess yes</th>
<th>high flying media married fiftiess yes</th>
<th>low football security single twentiess no</th>
<th>high golf media single thirtiess yes</th>
<th>medium golf transport married fortiesss yes</th>
<th>high skiing banking single thirtiess yes</th>
<th>low golf unemployed married fortiesss yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>highRisk</td>
<td>lowRisk</td>
<td>medRisk</td>
<td>highRisk</td>
<td>medRisk</td>
<td>lowRisk</td>
<td>highRisk</td>
<td>highRisk</td>
<td>highRisk</td>
</tr>
</tbody>
</table>
Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

Textbooks:
1. Machine Learning – Tom M. Mitchell-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang
   Juang.

Reference:
Course Objectives:
1. To know about various encryption techniques.
2. To understand the concept of Public key cryptography.
   1. To study about message authentication and hash functions
2. To impart knowledge on Network security

Course Outcomes:
1. Identify some of the factors driving the need for network security
2. Identify and classify particular examples of attacks
3. Define the terms vulnerability, threat and attack
4. Identify physical points of vulnerability in simple networks
5. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.

List of Experiments
1. Write a client-server program where client sends a text message to server and server sends the text message to client by changing the case (uppercase and lowercase) of each character in the message.
2. Write a client-server program to implement following classical encryption techniques:
   a. ceaser cipher
   b. transposition cipher
   c. row substitution cipher
   d. hill cipher
3. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory
4. Network Security and Management Tools:
5. Perform an experiment to demonstrate how to sniff for router traffic by using the tool wireshark
6. Using nmap
   a. Find open ports on a system
   b. Find the machines which are active
   c. Find the version of remote os on other systems
   d. Find the version of s/w installed on other system
7. Ethical Hacking:
   a. Setup a honey pot and monitor the honey pot on network
   b. Write a script or code to demonstrate SQL injection attacks
   c. Create a social networking website login page using phishing techniques
   d. Write a code to demonstrate DoS attacks
   e. Install rootkits and study variety of options
Textbooks:

Reference:
Course Objectives:
1. To introduce the raspberry PI platform, that is widely used in IoT applications
2. To introduce the implementation of distance sensor on IoT devices

Course Outcomes:
1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor
2. Get the skill to program using python scripting language which is used in many IoT devices

List of Experiments
1. Using raspberry pi
   a. Calculate the distance using distance sensor.
   b. Basic LED functionality.
2. Using Arduino
   a. Calculate the distance using distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using temperature sensor.
3. Using Node MCU
   a. Calculate the distance using distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using temperature sensor.

Textbooks:
Prerequisites:
1. Data communication, Basic networking principles

Course Objectives:
1. Understand and analyze the existing protocols
2. Understand the use of network packet capturing tools

Course Outcome:
1. Ability of acquiring the practical exposure to existing protocols

List of Experiments:
1. Implement the IP fragmentation and reassembly algorithm.
2. Implement the IP forwarding algorithm.
3. Implement the simplest sliding window protocol of TCP.
4. Connect two systems using a switch and configure private IP addresses to the systems and ping them from each other. Using Wireshark, capture packets and analyze all the header information in the packets captured.
5. Install Telnet on one of the systems connected by a switch and telnet to it from the other system. Using Wireshark, capture the packets and analyze the TCP 3-way Handshake for connection establishment and tear down.
6. Start packet capture in wireshark application and then open your web browser and type in an URL of website of your choice. How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received for the webpage you visited in your web browser.
Course Objectives:
1. Introduce research paper writing and induce paper publication skills.
2. Give the introduction to Intellectual Property Rights

Course Outcomes:
1. Ability to distinguish research methods
2. Ability to write and publish a technical research paper
3. Ability to review papers effectively
4. IPR and Patent filing

UNIT - I
Introduction
Objective of Research; Definition and Motivation; Types of Research; Research Approaches;
Steps in Research Process; Criteria of Good Research; Ethics in Research. Research
Formulation and Literature Review:
Problem Definition and Formulation; Literature Review; Characteristics of Good Research
Question; Literature Review Process.

UNIT - II
Data Collection
Primary and Secondary Data; Primary and Secondary Data Sources; Data Collection
Methods; Data Processing; Classification of Data.
Data Analysis
Statistical Analysis; Multivariate Analysis; Correlation Analysis; Regression Analysis;
Principle Component Analysis; Samplings

UNIT - III
Research Design
Need for Research Design; Features of a Good Design; Types of Research Designs; Induction
and Deduction.
Hypothesis Formulation and Testing
Hypothesis; Important Terms; Types of Research Hypothesis; Hypothesis Testing; Z-Test; t-
Test; f-Test; Making a Decision; Types of Errors; ROC Graphics.

UNIT - IV
Test Procedures
Parametric and Non Parametric Tests; ANOVA; Mann-Whitney Test; Kruskal-Wallis Test;
Chi-Square Test; Multi-Variate Analysis
Presentation of the Research Work
Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property
Rights; Open-Access Initiatives; Plagiarism.
UNIT - V
Law of Patents, Patent Searches, Ownership, Transfer Patentability Design Patents

Patent Infringement, New Developments and International Patent Law

Textbooks:
1. Research Methodology. Methods & Technique : Kothari. C.R.
2. Research Methodology, S.S Vinod Chandra, S AnandHareendran, Pearson

References:
M.Tech. CSE  
AR22 Regulations  

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)  
CHEERYAL (V), KEESSARA (M), MEDCHAL DIST., TELANGANA-501301  

20MAC101 – INDIAN CONSTITUTION  
(AUDITCOURSE-1)  

M.Tech. CSE I Year, I Semester  

Prerequisite(s): None  

Course Objectives:  
Develop ability to  
1. Understand the need for a constitution  
2. Appreciate the fundamental duties and rights of the citizens of India  
3. Explain the role of constitution in a democratic society  
4. Describe the Directive Principles of State Policy and their significance  
5. List the key features of the constitution, Union Government, and State Governments.  

Course Outcomes (COs):  
At the end of the course, student would be able to  
CO1. Create awareness about the constitutional values and objectives written in the Indian Constitution.  
CO2. List the fundamental rights and fundamental duties of Indian citizens.  
CO3. Identify the division of legislative, executive and financial powers between the union and the state governments.  
CO4. Understand the working of Indian democracy, its institutions and processes at the local, state and union levels.  
CO5. Explain the functions and responsibilities of Election commission of India and Union Public Service Commission.  

Unit I: Introduction to Indian Constitution  
Meaning of the term Constitution, Preamble of the Constitution, Constituent Assembly, The Salient Features of Indian Constitution  

Unit II: Fundamental Rights of citizen  
Fundamental Rights of citizen, Fundamental Duties of citizen, The Directive Principles of State Policy  

Unit III: Union Government  
Union Government, Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with Powers and Functions), Union Executive, President of India (with Powers and Functions), Prime Minister of India (with Powers and Functions), Union Judiciary (Supreme Court), Jurisdiction of the Supreme Court.  

Unit IV: State Government  
State Government , State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) , Powers and Functions of the State Legislature , State Executive, Governor of the State (with Powers and Functions) , The Chief Minister of the State (with Powers and Functions) State Judiciary (High Courts)
Unit V: Local Self Government
Election Commission of India (with Powers and Functions), The Union Public Service Commission (with Powers and Functions)

TEXT BOOKS:
2. Dr Durga Das Basu, Introduction to the Constitution of India, LexisNexis Publishers
3. NCERT, Indian Constitution at work

REFERENCE BOOKS:
Course Objectives:
Develop ability to
1. To improve the fluency of students in English
2. To facilitate learning through interaction
3. To illustrate the role of skills in real-life situations with case studies, role plays etc.
4. To train students in group dynamics, body language and various other activities which boost their confidence levels and help in their overall personality development
5. To encourage students develop behavioral skills and personal management skills
6. To impart training for empowerment, thereby preparing students to become successful professionals

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Developed critical acumen and creative ability besides making them industry-ready.
CO2. Appropriate use of English language while clearly articulating ideas.
CO3. Developing insights into Language and enrich the professional competence of the students.
CO4. Enable students to meet challenges in job and career advancement.

INTRODUCTION
Definition and Introduction to Soft Skills – Hard Skills vs Soft Skills – Significance of Soft/Life/Self Skills – Self and SWOT Analysis and

1. Exercises on Productivity Development
Effective/ Assertive Communication Skills (Activity based)
Time Management (Case Study)
Creativity & Critical Thinking (Case Study)
Decision Making and Problem Solving (Case Study)
Stress Management (Case Study)

2. Exercises on Personality Development Skills
Self-esteem (Case Study)
Positive Thinking (Case Study)
Emotional Intelligence (Case Study)
Team building and Leadership Skills (Case Study)
Conflict Management (Case Study)

3. Exercises on Presentation Skills
Netiquette
Importance of Oral Presentation – Defining Purpose- Analyzing the audience-Planning
Outline and Preparing the Presentation- Individual & Group Presentation- Graphical
Organizers- Tools and Multi-media Visuals
One Minute Presentations (Warming up)
PPT on Project Work- Understanding the Nuances of Delivery- Body Language – Closing
and Handling Questions – Rubrics for Individual Evaluation (Practice Sessions)

4. Exercises on Professional Etiquette and Communication
Role-Play and Simulation- Introducing oneself and others, Greetings, Apologies, Requests,
Agreement & Disagreement….etc.
Telephone Etiquette
Active Listening
Group Discussions (Case study) - Group Discussion as a part of Selection Procedure -
Checklist of GDs
Analysis of Selected Interviews (Objectives of Interview)
Mock-Interviews (Practice Sessions)
Job Application and Preparing Resume
Process Writing (Technical Vocabulary) – Writing a Project Report-Assignments

5. Exercises on Ethics and Values
Introduction — Types of Values - Personal, Social and Cultural Values - Importance of
Values in Various Contexts
Significance of Modern and Professional Etiquette – Etiquette (Formal and Informal
Situations with Examples)
Attitude, Good Manners and Work Culture (Live Examples)
Social Skills - Dealing with the Challenged (Live Examples)
Professional Responsibility – Adaptability (Live Examples)
Corporate Expectations

Note: Hand-outs are to be prepared and given to students.
Training plan will be integrated in the syllabus.
Topics mentioned in the syllabus are activity-based.

SUGGESTED READING:
Skills
Publisher. New Delhi.
Conversation Practice. New Delhi: Tata McGraw-Hill
10. Dixso, Richard J. Everyday Dialogues in English. Prentice Hall India Pvt Ltd
13. The Hindu Speaks on Education by the Hindu Newspaper
Prerequisites:
1. A course on “Computer Programming & Data Structures”
2. A course on “Advanced Data Structures & Algorithms”

Course Objectives:
1. Introduces the recurrence relations for analyzing the algorithms
2. Introduces the graphs and their traversals.
3. Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming, Brute Force, Transform and Conquer approaches) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-case, average-case and best-case analysis.
5. Introduces string matching algorithms
6. Introduces linear programming.

Course Outcomes:
1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I
Classification of algorithms, Algorithm Specifications, Mathematical analysis of Recursive Algorithms
Introduction to recurrence equations, formulation of recurrence equations, Techniques for solving recurrence equations, Solving recurrence equations, Solving Recurrence Equations using polynomial reduction, Divide and conquer recurrences

UNIT - II
Graphs
Graph representations, Graph traversals
Brute Force Approaches
Computational Geometry Problems-Closest pair problem, Convex Hull Problem, Exhaustive Searching- Magic Squares problem, Container Loading problem, Knapsack Problem, Assignment Problem

UNIT - III
Divide and Conquer approach
Multiplication of long integers, Strassen’s matrix multiplication, Fourier Transform
Greedy algorithms:- Coin change problem, Scheduling problems, knapsack problem, optimal storage on tapes, optimal tree problems, optimal graph problems
UNIT - IV
Transform and Conquer approach
Matrix operations- Gaussian Elimination method, LU decomposition, Crout’s method of decomposition
Dynamic Programming
Computing binomial coefficients, Multistage graph problem, Transitive Closure and Warshall algorithm, Floyd warshall all pairs shortest path problem, TSP, Flow shop scheduling algorithm

UNIT - V
String algorithms
Basic string algorithms, Longest Common Subsequences.
Linear Programming, Graphical method for solving LPP, Simplex method, Minimization problems, Principle of Duality, Max Flow problem

Textbook:
1. Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References:
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education
M.Tech. CSE

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20MCS203 – SOFT COMPUTING

M.Tech. CSE I Year, II Semester

Course Objectives:
1. Familiarize with soft computing concepts
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets.

Course Outcomes:
1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. Apply the Classification and clustering techniques on various applications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

UNIT-I

UNIT-II

UNIT-III
Fuzzy Decision Making, Particle Swarm Optimization,

UNIT-IV

UNIT-V
Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Text Books:
References:
Course Objectives:
1. Know the history and evaluation of digital forensics
2. Describe various types of cyber crime
3. Understand benefits of forensics
4. Implement forensics readiness plan

Course Outcomes:
1. Interpret and appropriately apply the laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
2. Create a method for gathering, assessing and applying new and existing legislation and industry trends specific to the practice of digital forensics

UNIT - I
Computer Forensics Fundamentals

UNIT - II
Evidence Collection and Data Seizure

UNIT - III
Computer 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 honeynet 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 Computer Forensic tools
Evaluating computer forensic tool needs, computer forensics software tools, computer 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.

Textbooks:

References:
1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison-Wesley Pearson Education
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH 2005
6. Windows Forensics by Chad Steel, Wiley India Edition.
20MCS205 – DATA ANALYTICS
M.Tech. CSE I Year, II Semester

Course Objectives:
1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis.
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. To understand the various search methods and visualization techniques.

Course Outcomes:
1. Understand the impact of data analytics for business decisions and strategy.
2. Carry out data analysis/statistical analysis.
3. To carry out standard data visualization and formal inference procedures.
5. Understand various Data Sources.

UNIT - I
Data Management
Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II
Data Analytics
Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III
Regression
Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.
Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV
Object Segmentation
Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.
Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction.
UNIT - V
Data Visualization
Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Textbooks:
1. Student’s Handbook for Associate Analytics – II, III.

References:
1. Introduction to Data Mining, Tan, Steinbach and Kumar, AddisonWisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
Prerequisites:
1. A Course on “Computer Organization & Architecture”
2. A Course on “Operating Systems”
3. A Course on “Computer Programming”

Course Objectives:
1. To introduce the foundations of parallel Computing
2. To learn various parallel computing architectures and programming models
3. To gain knowledge of writing efficient parallel programs

Course Outcomes:
1. Ability to understand the concepts of parallel architectures
2. Ability to select the data structures that efficiently model the information in a problem.
3. Ability to develop an efficient parallel algorithm to solve it.
4. Ability to implement an efficient and correct code to solve it, analyse its performance

UNIT – I
Parallel Computing
Introduction, Motivation and scope - Parallel Programming Platforms – Basic Communication Operations

UNIT - II
Principles of Parallel Algorithm Design
Analytical Modelling of Parallel Programs

UNIT - III
Programming using Message Passing Paradigm (MPI)
Programming Shared Address Space Platforms (PThreads)

UNIT - IV
Dense Matric Algorithms (Matrix-Vector Multiplication, Matrix-Matrix Multiplication)
Sorting Algorithms (Issues, Bubble Sort, Quick Sort, Bucket Sort, Enumeration Sort, Radix Sort)

UNIT - V
Graph Algorithms (Minimum Spanning Tree: Prim's Algorithm)
Single-Source Shortest Paths: Dijkstra's Algorithm) Search Algorithms ( DFS, BFS)

Textbook:
References:
2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy, PHI.
Prerequisites:
1. Knowledge in security and applied cryptography
2. Knowledge in distributed databases

Course Objectives:
1. Give an introduction to blockchain technology and Cryptocurrency

Course Outcomes:
1. Familiarise the functional/operational aspects of Cryptocurrency ECOSYSTEM.
2. Understand emerging abstract models for Blockchain Technology.
3. Identify major research challenges and technical gaps existing between theory and practice in Cryptocurrency domain

UNIT- I
Introduction
Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding

UNIT- II
Extensibility of Blockchain concepts
Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment

UNIT- III
Blockchain Science
Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs

UNIT - IV
Currency
Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency

UNIT - V
Technical challenges
Business model challenges, Scandals and Public perception, Government Regulations

Textbook:
1. Blockchain Blue print for Economy, Melanie Swan, SPD Oreily.

Reference:
Course Objectives:
1. To understand the design principles of developing a Human Computer Interface (HCI).
2. To learn tools and devices required for designing a good interface

Course Outcomes:
1. Acquire knowledge on principles and components of HCI.
2. Analyze product usability evaluations and testing methods
3. Design an effective user interface for software application using the building tools and techniques

UNIT - I
Introduction
Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design
The graphical user interface
Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user – interface popularity, characteristics- Principles of user interface.

UNIT - II
Design process
Human interaction with computers, important of human characteristics in design, human considerations in design, Human interaction speeds, understanding business junctions.

UNIT - III
Screen Designing
Interface design goals, Screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT - IV
Windows - Window characteristics, components of a window, presentation styles, types, management, organizing window functions, operations Selection of device based and screen based controls.

UNIT - V
Write clear text and messages - Create meaningful Graphics, Icons, Images, Choose proper colors
Interaction Devices - Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.
Text Books:

Reference:
Course Objectives:
1. To review image processing techniques for computer vision
2. To understand shape and region analysis
3. To understand Hough Transform and its applications to detect lines, circles, ellipses
4. To understand three-dimensional image analysis techniques
5. To understand motion analysis
6. To study some applications of computer vision algorithms

Course Outcomes:
1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
2. Describe known principles of human visual system.
3. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,
4. Suggest a design of a computer vision system for a specific problem

UNIT - I
Image Processing Foundations
Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

UNIT - II
Shapes and regions

UNIT - III
Hough Transform

UNIT - IV
3D Vision And Motion

UNIT - V
Applications

Textbook:

References:
Prerequisites:
1. A course on “Database Management Systems”

Course Objectives:
1. To acquire knowledge on parallel and distributed databases and its applications.
2. To study the usage and applications of Object Oriented databases.
3. To learn the modeling and design of databases
4. To acquire knowledge on parallel and distributed databases and its applications.
5. Equip students with principles and knowledge of parallel and object oriented databases.
6. Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Course Outcomes:
1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Understand the design aspects of object oriented database system and related development.
4. Ability to write global queries for distributed databases.

UNIT - I
Distributed Databases: An Overview
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
Translation of Global Queries to Fragment Queries

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, Non blocking 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, Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

Textbooks:
1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.

References:
Pre-requisites:
1. The course assumes a reasonable comfort and background about Information Technology and Management Information Systems.

Course Objectives:
1. To gain understanding of the basic principles of service orientation
2. To learn service oriented analysis techniques
3. To learn technology underlying the service design
4. To learn the concepts such as SOAP, Registering and Discovering Services.

Course Outcomes:
At the end of this course, students are expected to gain the following learning:
1. Get the foundations and concepts of service based computing
2. Advocate the importance and means of technology alignment with business
3. Understanding the basic operational model of web services,
4. Gain the knowledge of key technologies in the service oriented computing arena
5. Apply and practice the learning through a real or illustrative project/case study.

UNIT - I
Software Architecture: Need for Software Architecture, Objectives of Software Architecture, Types of Information Technology (IT) Architecture, Architectural Patterns and Styles

UNIT - II

UNIT - III
Service-Oriented Applications: Considerations for Service-oriented Applications, Patterns for SOA, Pattern-based Architecture for Service-oriented Applications, Composite Applications, Composite Application Programming Model
Service-Oriented Analysis and Design: Need for Models, Principles of Service Design, Non-functional Properties for Services, Design of Activity Services (or Business Services) Design of Data Services, Design of Client Services, Design of Business Process Services
UNIT - IV
Cloud and MSA: Cloud Services, Hybrid Cloud Services, Considerations for Hybrid Cloud Services, Cloud Services and MSA, MSA for SMAC Solutions

UNIT - V
Mobile and MSA: Mobile Technologies, Types of Mobile Applications, MSA for mobile solutions
Case Study: SOA – Loan Management System (LMS) PoC, MSA – APIaryPoC

Text book:
Course Objective:
1. The student can able to attain knowledge in advance algorithms.

Course Outcome:
1. The student can able to analyze the performance of algorithms

List of Experiments
1. Implement assignment problem using Brute Force method
2. Perform multiplication of long integers using divide and conquer method.
4. Implement Gaussian elimination method.
5. Implement LU decomposition
6. Implement Warshall algorithm
8. Implement KMP algorithm.
9. Implement Harspool algorithm
10. Implement max-flow problem.

Textbook:
1. Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References:
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education
Course Objectives:
1. To provide students with a comprehensive overview of collecting, investigating, preserving, and presenting evidence of cyber crime left in digital storage devices, emails, browsers, mobile devices using different Forensics tools.
2. To Understand file system basics and where hidden files may lie on the disk, as well as how to extract the data and preserve it for analysis.
3. Understand some of the tools of e-discovery.
4. To understand the network analysis, Registry analysis and analyse attacks using different forensics tools.

Course Outcomes:
1. Learn the importance of a systematic procedure for investigation of data found on digital storage media that might provide evidence of wrong-doing.
2. To learn the file system storage mechanisms and retrieve files in hidden format.
3. Learn the use of computer forensics tools used in data analysis.
4. Learn how to find data that may be clear or hidden on a computer disk, find our the open ports for the attackers through network analysis, Registry analysis.

List of Experiments
1. Perform email analysis using the tools like Exchange EDB viewer, MBOX viewer and View user mailboxes and public folders, Filter the mailbox data based on various criteria, Search for particular items in user mailboxes and public folders.
2. Perform Browser history analysis and get the downloaded content, history, savedlogins, searches, websites visited etc using Foxton Forensics tool, Dumpzilla.
3. Perform mobile analysis in the form of retrieving call logs, SMS log, all contacts list using the forensics tool like SAFT.
4. Perform Registry analysis and get boot time logging using process monitor tool.
5. Perform Disk imaging and cloning the using the X-way Forensics tools.
6. Perform Data Analysis i.e. History about open file and folder, and view folder actions using Lastview activity tool.
7. Perform Network analysis using the Network Miner tool.
10. Perform Memory capture and analysis using the Live RAM capture or any forensic tool.

Textbooks:
References:
1. Real Digital Forensics by Keith J. Jones, Richard Bejtich, Curtis W. Rose, Addison-Wesley Pearson Education
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH 2005
6. Windows Forensics by Chad Steel, Wiley India Edition.
Course Objectives:
1. To provide an overview of a new language R used for data Analytics.
2. To present the basic techniques for extracting information from large datasets.
3. To familiarize students with how various statistics like mean, median etc. can be collected for data exploration.
4. To predict outcomes with supervised learning techniques and unearth the patterns with unsupervised techniques.

Course Outcomes:
After completion of this course students will be able to
1. Understand different file formats like .csv and .txt and learn how access these files.
2. Work on data preprocessing methods.
3. Understand various data sources.
4. Carry out statistical analysis.
5. Understand various techniques to visualize results of data.

List of Experiments
1. Demonstrate data cleaning – missing values.
2. Implement data normalization (min-max, z-score).
3. Implement attribute subset selection for data reduction.
4. Demonstrate outlier detection.
5. Perform analytics on any standard data set.
6. Implement linear regression.
7. Implement logistic regression.
8. Construct decision tree for weather data set.
9. Analyze time-series data.
10. Work on any data visualization tool.

Textbooks:
1. Student’s Handbook for Associate Analytics – II, III.

References:
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wisley, 2006.
M.Tech. CSE

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
CHEERYAL (V), KEESSARA (M), MEDCHAL DIST., TELANGANA-501301

20MCS2L4 – PARALLEL COMPUTING LAB
M.Tech. CSE I Year, II Semester

Prerequisites:
1. A Course on “Computer Organization & Architecture”
2. A Course on “Operating Systems”
3. A Course on “Computer Programming”

Course Objectives:
1. To introduce the foundations of parallel computing
2. To learn various parallel computing architectures and programming models
3. To gain knowledge of writing efficient parallel programs

Course Outcomes:
1. Ability to understand the concepts of parallel architectures
2. Ability to select the data structures that efficiently model the information in a problem.
3. Ability to develop an efficient parallel algorithm to solve it.
4. Ability to implement an efficient and correct code to solve it, analyze its performance

List of Programs
1. Design a parallel program to implement Matrix-Vector and Matrix-Matrix Multiplication using MPI library.
2. Design a parallel program to implement Bubble Sort using OpenMP and Pthread Programming Constructs.
3. Design a parallel program to implement Quick Sort using OpenMP and Pthread Programming Constructs.
4. Design a parallel program to implement Bucket Sort using OpenMP and Pthread Programming Constructs.
5. Design a parallel program to implement Prim's Algorithm using OpenMP and Pthread Programming Constructs.
6. Design a parallel program to implement DFS Algorithm using OpenMP and Pthread Programming Constructs.
7. Design a parallel program to implement BFS Algorithm using OpenMP and Pthread Programming Constructs.
8. Design a parallel program to implement Dijkstra's Algorithm using MPI library.

Textbook:

References:
2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy, PHI.
Course Objective:
1. The main objective of this course is to provide the knowledge in implementing Blockchains using hash algorithms and bitcoins generation.

Course Outcome:
1. By the end of this course students will be able to learn various Hash Algorithms and generation of Bitcoins.

List of Experiments
1. Implement Block hash using SHA-256 algorithm using java code or python code.
2. Implement Message authentication using Java code or Python code.
3. Implement MD5 algorithm using Java code or python code.
4. Implement RIPEMD-160 algorithm using Java code or python code.
5. Implement Whirlpool algorithm using Java code or python code.
6. Write a case study how the Bitcoins were generated and implemented.

Textbook:
1. Blockchain Blueprint for Economy, Melanie Swan, SPD Oreilly.

Reference:
M.Tech. CSE I Year, II Semester

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Imbibe and internalize the Values and Ethical Behavior
2. Understand the basic theories of Ethics
3. Practice as a professional engineer.
4. Identify work place ethics.
5. Understand international ethical practices.

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
CO2. Understand ethics in professional careers.
CO3. Learn the rights and responsibilities as an employee.
CO4. Understand work ethics
CO5. Understand Global ethics

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 : Basic Theories

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 : Global issues in Professional Ethics

TEXT BOOKS:

REFERENCE BOOKS:
M.Tech. CSE I Year, II Semester

Prerequisite(s): None.

Course Objectives:
Develop ability to
1. Acquire knowledge on disasters 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 (COs):
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 reducing 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
Exogenous Hazards/ Disasters: Infrequent events – Cumulative atmospheric hazards/ disasters.
Infrequent events: Cyclones – Lightning – Hailstorms.

Cyclones: Tropical cyclones & Local storms – Destruction by tropical cyclones & local storms (causes, distribution, human adjustment, perception & mitigation)


Floods: Causes of floods – Flood hazards – Flood control measures (Human adjustment, perception & mitigation).


Biological hazards/ disasters: Population Explosion.

UNIT–V

Emerging approaches in Disaster Management – Three Stages
1) Pre-disaster stage (preparedness)
2) Emergency Stage
3) Post Disaster stage – Rehabilitation

TEXT BOOKS:
2. Disaster Management, Dr. Mrinalini Pandey, Wiley India Pvt Ltd., 2014.

REFERENCE BOOKS:
3. Natural Hazards and Disasters, Donald Hyndman and David Hyndman, Cengage Learning, 2013.
Prerequisites:
1. A course on “Mathematics”

Course Objectives:
1. This course explains various optimization problems and the techniques to address those problems.
2. To study Linear Programming, dynamic programming and optimization Techniques etc.
3. To understand the theory of games.

Course Outcomes:
1. Gain the knowledge of optimization techniques
2. Get the skill to apply Optimization techniques to address the real time problems.

UNIT – I
Introduction
Allocation

UNIT – II
Transportation Problem
Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.
Assignment Problem
Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

UNIT - III
Sequencing
Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through ‘m’ machines
Replacement
Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

UNIT - IV
Theory Of Games
Introduction –Terminology– Solution of games with saddle points and without saddle points- 2x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.
Inventory
Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks – Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

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

Dynamic Programming

Textbooks:
2. Introduction to Operations Research, Taha, PHI

References:
1. Operations Research: Methods and Problems, Maurice Saseini, ArhurYaspan and Lawrence Friedman
Prerequisites:
1. A Course on “Computer Organization & Architecture”
2. Operating System Programming

Course Objectives:
1. To Improve the system performance
2. To learn various distributed and parallel computing architecture
3. To learn different computing technologies

Course Outcomes:
1. Understanding the concepts in grid computing
2. Ability to set up cluster and run parallel applications
3. Ability to understand the cluster projects and cluster OS
4. Understanding the concepts of pervasive computing & quantum computing.

UNIT - I
**Grid Computing:** Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (IBM).

UNIT - II
**Cluster Computing at a Glance:** Introduction, A Cluster Computer and its Architecture, Cluster Classifications, Commodity Components for clusters, Network Services/Communication SW, Cluster Middleware and SSI, RMS, Programming Environments and Tools, Cluster Applications

**Cluster Setup & Its Administration:** Introduction, Setting up the cluster, Example Cluster System – Beowulf;


UNIT - III
**Job and Resource Management Systems:** Need of Job management, Components and Architecture. **Scheduling Parallel Jobs on Clusters:** Introduction, Rigid Jobs with process migration, Malleable Jobs with Dynamic Parallelism, Communication-Based Coscheduling, Batch Scheduling. **Cluster Operating Systems:** COMPaS

UNIT - IV
**Pervasive Computing Concepts & Scenarios:** Hardware & Software; Human – Machine Interface.
**Device Connectivity:** Java For Pervasive Devices; Application Examples.
UNIT - V
Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

Textbooks:
2. High Performance Cluster Computing, Raj kumarBuyya, pearson Education.
3. Pervasive Computing, J. Burkhardt et.al, Pearson Education

References:
2. Quantum computing and Quantum Information, Neilsen& Chung L:, Cambridge University Press.
3. A networking approach to Grid Computing , Minoli , Wiley
M.Tech. CSE  AR22 Regulations

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20MCS304 – ADHOC & SENSOR NETWORKS
M.Tech. CSE II Year, I Semester

Pre-requisites:
1. A Course on “Computer Networks”
2. A Course on “Distributed Systems”
3. A Course on “Mobile Computing”

Course Objectives:
1. To understand the concepts of sensor networks
2. To understand the MAC and transport protocols for adhoc networks
3. To understand the security of sensor networks
4. To understand the applications of adhoc and sensor networks

Course Outcomes:
1. Understanding the state of the art research in emerging subject of ad hoc and wireless sensor networks (ASN)
2. Ability to solve the issues in real-time application development based on ASN
3. Ability to conduct further research in the ASN domain

UNIT - I
Introduction to Ad Hoc Networks
Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs
Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies
Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT - II
Data Transmission
Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree- based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR and Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.

UNIT - III
Geocasting
Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR, TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc
UNIT - IV
Basics of Wireless, Sensors and Lower Layer Issues
Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V
Upper Layer Issues of WSN
Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Textbooks:
Course Objective:
1. Students must demonstrate knowledge of collecting and managing the relevant data of web and Social media analytics,
2. Identify the social business analytics and analyzing mobile data analytics with respect to publishers, operators and e-mail marketing.

Course Outcomes:
1. Understand the basic concepts of Web and Social Analytics.
2. Explain the process of collecting relevant data.
3. Identify the common business objectives.
4. Understand the concepts of mobile analytics.
5. Explain the concepts of mobile customer experience.
6. Analyze the mobile analytics for publisher, operator and email marketing.

UNIT - I

UNIT - II
The Awesome World of Click Stream Analysis: Metrics, Standard Metrics Revisited: Eight Critical Web Metrics, Visits and Visitors, Time on Page and Time on Site, Bounce Rate, Exit Rate, Conversion Rate, Engagement, Web Metrics Demystified, Four Attributes of Great Metrics, Example of a Great Web Metric, Strategically-aligned Tactics for Impactful Web Metrics, Diagnosing the Root Cause of a Metric’s Performance—Conversion, Leveraging Custom Reporting, Starting with Macro Insights

UNIT - III
The Key to Glory: Measuring Success: Focus on the “Critical Few”, Five Examples of Actionable Outcome KPIs, Task Completion Rate, Share of Search, Visitor Loyalty and Recency, RSS/Feed Subscribers, % of Valuable Exits, Moving Beyond Conversion Rates, Cart and Checkout Abandonment, Days and Visits to Purchase, Average Order Value, Primary Purpose (Identify the Convertible), Measuring Macro and Micro Conversions, Examples of Macro and Micro Conversions, Quantifying Economic Value, Measuring Success for a Non-ecommerce Website, Visitor Loyalty, Visitor Recency, Length of Visit, Depth of Visit, Measuring B2B Websites.
UNIT - IV


UNIT - V

Mobile Analytics: How Mobile Is Different than Other Digital Channels

Textbooks:
1. Stanley Wasserman, Katherine Faust, “Social Network Analysis: Methods And Applications” Cambridge University Press. (Chapter -1)

References:
1. Social, Web and Mobile Analytics (IBM ICE Publication)
M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand the different methods of Business analysis
2. Understand how to categorize and classify data
3. Understand the process of classification using predictive analytics
4. Understand the process of decision making using decision analysis techniques
5. Understand the concept of big data and big data processing architectures and technologies

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Identify various methods of business analysis
CO2: Use the concept of categorization and classification on different types of data.
CO3: Use predictive analytics techniques to classify the given data
CO4: Apply various decision analysis techniques on given data
CO5: Describe big data, big data architectures and technologies

UNIT I: INTRODUCTION
Business Analytics- Define Business Analytics, Importance of Business Analytics, Resources Important to Support Business Analytics, A categorization of Analytical Methods and Model-Predictive Analytics, Descriptive Analytics, Prescriptive Analytics.

UNIT II: DESCRIPTIVE STATISTICS
Overview using Data-Definition and Goals, Types of Data-Population and Sample Data, Quantitative and categorical data, Cross Sectional and Time Series Data, Sources of data. Data Preparation: treatment of missing data, identification of outliers and erroneous data.

Creating Distribution from Data- Frequency distribution for Quantitative and Categorical Data, Relative and Frequency Distribution, Cumulative Distributions, Measures of Dispersion and Skewness.

UNIT III: PREDICTIVE ANALYTICS
Probability- an Introduction to modelling uncertainty– Conditional Probability, Random variables Discrete Probability distribution, Continuous Probability Distribution
Simple linear regression: Coefficient of determination, Significance tests for predictor variables, Residual analysis, Application of predictive analytics in retail, direct marketing, health care, financial services, insurance, supply chain, etc. Regression estimates types and models.

UNIT IV: DECISION ANALYSIS
Problem Formulation - Decision Trees, Payoff Table, Decision Analysis with Probabilities, Decision Analysis without Probabilities, Decision Analysis with sample information.

UNIT V: BIG DATA
Introduction to Big Data; Defining Big Data, Big Data examples, Working with Big Data - Introduction, Data Volume, Data Velocity, Data Variety

Processing Architectures - Introduction, data processing infrastructure challenges, shared everything and shared nothing architectures, big data processing, Big Data Technologies - Introduction, big data processing requirements, Technologies for big data processing: Google file system, Hadoop, Hadoop core components.

TEXT BOOKS:

REFERENCE BOOKS:
1. The Kimball Group Reader: Practical Tools for Data Warehousing and Business Intelligence by Ralph Kimball and Margy Ross
4. Business Analytics, Sahil Raj, Cengage Learning
M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course Objectives:
1. Determine responsibility for safety in the workplace.
2. Learn to recognize workplace hazards.
3. Learn how to develop procedures to eliminate or lessen those hazards.
4. Apply basic Federal and State Safety Rules to the workplace.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Understand the fundamental concepts of accident prevention with a basic knowledge of safe work rules designed to promote an accident free workplace.
- CO2: Understand the relief systems.
- CO3: Understand the electrical hazards and safety handling of equipments.
- CO4: Understand the effects of momentum and buoyancy.
- CO5: Understand different case studies.

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, vapors, gases and their mixture from storage tanks and equipment; Estimation of leakage/spill rate through hole, pipes and vessel burst. Mitigation measures for leaks and releases. Electrical safety management in the IT sector - Maintaining the electrical safety of computer equipment, Employee electrical safety at work.

UNIT V
CASE STUDIES: Flix borough, 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)
4. Indian Electricity Act and Rules, Government of India.
M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand the significance of Operations Research and formulation of LPP models.
2. Understand the Algorithms of Graphical and Simplex Methods.
3. Understand the Transportation and Assignment techniques.
4. Understand the concepts of sequencing and replacement models.
5. Understand the concepts of Game theory and Inventory Control.
6. Students will understand the concepts of queuing theory and DPP.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Describe the importance of Operations Research, Formulate a managerial decision problem into a mathematical model to solve by simplex method;
CO2: Formulate and apply transportation and assignment problems for engineering and managerial situations.
CO3: Apply sequencing and replacement concepts in industry applications
CO4: Apply game theory and inventory concepts in industry applications
CO5: Apply dynamic programming technique and queuing theory in industry applications

UNIT I

UNIT II
Assignment Problem: Introduction, Hungarian technique of Assignment problems, unbalanced problems, problems with restrictions, Maximization in Assignment problems. Travelling salesman problem

UNIT III
Job Sequencing: Introduction – Flow Shop sequencing, n jobs through 2 machines, n jobs through 3 machines, Job shop sequencing, 2 jobs through ‘m’ machines-graphical model.
Replacement Model: Introduction – Replacement of items that deteriorate with time, when money value is not counted and counted, Replacement of items that fail completely, Group Replacement.

UNIT IV
Theory of Games: Introduction – Terminology– Solution of games with saddle points and without saddle points, 2 x 2 games, m x 2 and 2 x n games - graphical method, m x n games, dominance principle.

Inventory Models: Introduction – Concept of EOQ, Single item - Deterministic models – Types
- Purchase inventory models with one price break and multiple price breaks, Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT V
Queuing Theory: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel
– Poisson arrivals and exponential service times with infinite population.


TEXT BOOK(S)

REFERENCE BOOK(S)
M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course objectives:
Develop ability to
1. Understand the principles of resource planning and value management.
2. Understand the different methods of project cost estimation.
3. Learn the concepts of cost and budgeting.
4. Gain knowledge of cost variance and network analysis.
5. Learn about capital management and network techniques.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Explain the principles of resource planning and value management.
CO2: Apply the methods of project cost estimation.
CO3: Prepare the budget for an engineering project.
CO4: Analyze cost variance and network in projects.
CO5: Identify the critical path and determine the capital cost.

UNIT I

UNIT II

UNIT III
Cost concepts, break even analysis, Budgeting and budgeting control system, classification and types of budgets, fixed and flexible budgets, sales budget, production budget, cost of production budget, materials budget, direct labor budget, overhead cost budget, selling and distribution overhead budget.

UNIT IV
Standard costing and variance analysis in relation to construction, direct material variance, direct labor variance, overhead variances, job, batch and contract costing- procedures, determination of economic batch, Network analysis as a basis for cost control.
UNIT V
Working capital, working capital at project level management of cash, Receivable management, Inventory management, price level accounting (Inflation Accounting), project management network techniques- program evaluation review techniques and critical path method.

TEXT BOOK(S)

REFERENCE BOOK(S)
Course objectives: Develop ability to
1. Overview engineering materials
2. Understand the concept of tailored properties of materials
3. Select or devise a manufacturing method to synthesize composite materials
4. Test and evaluate mechanical properties of composite materials

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Classify the materials and identify the necessity to adopt composite materials
CO2: Identify the role of reinforcement in the composites to enhance mechanical properties of materials
CO3: Comprehend on reinforced composites and select application specific composite
CO4: Select a manufacturing method for synthesis of composite material
CO5: Infer on testing of composite materials in the evaluation of mechanical properties of composite materials

UNIT I
Introduction: Classifications of Engineering Materials, Concept of composite materials, Matrix materials, Functions of a Matrix, Desired Properties of a Matrix, Polymer Matrix (Thermosets and Thermoplastics), Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc.

UNIT II
Types of Reinforcements/Fibers: Role and Selection or reinforcement materials, Types of fibres, Glass fibers, Carbon fibers, Aramid fibers, Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc., Mechanical properties of fibres. Material properties that can be improved by forming a composite material and its engineering potential

UNIT III
Various types of composites: Classification based on Matrix Material: Organic Matrix composites, Polymer matrix composites (PMC), Carbon matrix Composites or Carbon-Carbon Composites, Metal matrix composites (MMC), Ceramic matrix composites (CMC); Classification based on reinforcements: Fiber Reinforced Composites, Fiber Reinforced Polymer (FRP) Composites, Laminar Composites, Particulate Composites, Comparison with Metals, Advantages & limitations of Composites
UNIT IV

UNIT V
Testing of Composites: Mechanical testing of composites, tensile testing, Compressive testing, Intra-laminar shear testing, Inter-laminar shear testing, Fracture testing etc.

TEXT BOOK(S)

REFERENCE BOOK(S)
1. Thermal Analysis of Materials, R.F. Speyer, Marcel Decker,
M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course objectives:
Develop ability to
1. Identify various sources of solid waste generation.
2. Compare various methods of solid waste disposal.
3. Understand various energy generation methods.
4. Process various solid wastes so as to produce generate renewable energy.
5. Use methods of recycling the e-waste.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Explain principles of integrated solid waste management.
CO2: Examine the land fill method of solid waste disposal.
CO3: Explain energy generation from bio-chemical conversion of solid waste.
CO4: Explain energy generation from thermo-chemical conversion of solid waste.
CO5: Explain management of e-waste.

UNIT I

UNIT II
Land Fill method of Solid waste disposal Land fill classification, Types, methods and Sitting consideration. Layout and preliminary design of landfills: Composition, characteristics, generation, Movement and control of landfill leach ate and gases, Environmental monitoring system for land fill gases.

UNIT III
UNIT IV
Biogas production, Land fill gas generation and utilization, Thermo-chemical conversion:
Sources of energy generation, Gasification of waste using Gasifiers, Briquetting, Utilization and advantages of briquetting, Environmental benefits of Bio-chemical and Thermo-chemical conversion.

UNIT V

TEXT BOOK(S)

REFERENCE BOOK(S)

GOOGLE BOOKS:
2. What is the impact of E-waste: Tamara Thompson
3. E-waste poses a Health Hazard: SairudeenPattazhy
20MOE307 – POWER FROM RENEWABLE ENERGY SOURCES
(OPEN ELECTIVE)

M.Tech. CSE II Year, I Semester

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Provide knowledge of solar energy concept and applications.
2. Impart knowledge of geothermal, ocean and tidal energy and their applications.
3. Understand the design of wind mills and applications.
4. Understand the turbines and generators for small scale hydroelectric generation.
5. Understand the important parts of a biogas plant, design and principle of bio-diesel.

Course Outcomes (COs):
At the end of the course student will be able to
CO1: Attain the knowledge of solar concepts, solar collector and solar desalination.
CO2: Attain the knowledge of geothermal applications, energy generation, power generation by tidal energy.
CO3: Attain the knowledge of design of wind mills and energy estimations and also wind energy applications.
CO4: Attain the knowledge the turbines and generators for small scale hydroelectric generation and advantages and limitations of small scale hydro-electric.
CO5: Attain the knowledge of design of bio gas plant and bio diesel applications.

UNIT I: SOLAR ENERGY

UNIT II: BIO ENERGY
Introduction and scope of bio energy, biogas, bio fuels, bio gasifiers-applications,

UNIT III: WIND ENERGY
Introduction to wind energy, wind energy potential in India and world, wind farms and mills & their applications,

UNIT IV: GEOTHERMAL AND OCEANS ENERGY
Potential sites, estimations of geothermal power, nature of geothermal sites, hot-dry rocks resources, magma resources, systems for energy generation, applications of geothermal energy, environmental issues, basic theory of ocean thermal energy conversion, potential and application of technologies, basic theory of wave energy, potential and technologies, basic theory of tidal energy, potential and technologies, methods of ocean thermal electric power generation.
UNIT V: FUEL CELLS AND HYDROGEN ENERGY
Introduction, principle of fuel cells, thermodynamic analysis of fuel cells, types of fuel cells, fuel cell batteries, applications of fuel cells.

TEXT BOOK(S)

REFERENCE BOOK(S)