CMR COLLEGE OF ENGINEERING& TECHNOLOGY

(UGC Autonomous)

Kandlakoya, Medchal Road, Hyderabad – 501 401

ACADEMIC REGULATIONS - R 22

FOR CBCS & OUTCOME BASED B.TECH (REGULAR, HONOURS and MINOR) PROGRAMMES

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

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

CMR College of Engineering & Technology, Hyderabad offers 4 Years (8 Semesters) Bachelor of Technology (B.Tech.) Regular, Honours and Minor degree Programmes, under Choice Based Credit System (CBCS), with effect from the Academic Year 2022-23 and onwards, in the Branches of Engineering.

2.0 Eligibility for Admission

2.1 Admissions will be done as per the norms prescribed by the Government of Telangana. The Government orders in vogue shall prevail.

2.2 The candidate should have passed the qualifying examination Intermediate or equivalent on the date of admission.

2.3 Seats in each program in the college are classified into Category–A (70% of intake) and Category-B (30% of intake) besides Lateral Entry. Category-A seats will be filled by the Convener, TSEAMCET Admissions. Category-B seats will be filled by the College as per the guidelines of the Competent Authority.

2.4 Lateral Entry seats for 10% of the candidates from the approved strength of the course shall be admitted into the III Semester directly based on the rank secured by the candidate in TSECET in accordance with the guidelines from the Competent Authority.

2.5 The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only

3.0 B.Tech. Programme Structure

3.1 A student after securing admission shall complete the B.Tech. programme in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate programme and award of the B.Tech. degree.

3.2 **UGC/ AICTE** specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

3.2.1 Semester Scheme

Each undergraduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters (First/Odd and Second/Even). Each Semester shall have a minimum of 90 Instructional Days.

semester - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/course structure suggested by AICTE are followed.

3.2.2 Credit Courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

- One credit for one hour/ week/ semester for Theory/ Lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for Laboratory/ Practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab are mandatory courses. These courses will not carry any credits.

3.2.3 Subject Course Classification

All subjects/ courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The University has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BSC – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ESC - Engineering Sciences	Includes Fundamental Engineering Subjects
3		HSMC – Humanities andSocial Sciences	Includes subjects related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PCC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (EℓC)	PEC – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OEC – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.

7	Core Courses (PROJ)	Project Work	B.Tech. Project or UG Project or UG Major Project or Project Stage I & II
8		Industry Training/ Internship/ Mini-project/ Mini- Project/ Skill Development Courses	Industry Training/ Internship/ Mini-Project/ Mini-Project/ Skill DevelopmentCourses
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor Courses	-	1 or 2 Credit Courses (subset of HSMC)
11	Mandatory Courses (MC)	-	Mandatory Courses (non-credit)

4.0 Course Registration

4.1 A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

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

4.3 A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, Faculty Advisor/ Counselor and the student.

4.4 A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 6 Credits (any 2 elective subjects), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites'** as indicated for various subjects/ courses, in the department course structure and syllabus contents.

4.5 Choice for '**additional subjects/courses**', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Mentor/HOD.

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

4.7 Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered.

However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within **a week** after the commencement of class-work for that semester.

4.8 Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

4.9 **Open Electives**: The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

4.10 **Professional Electives**: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

5.0 Subjects/ courses to be offered

5.1 A subject/ course may be offered to the students, **only if** a minimum of 15 students opt for it.

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

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

5.4 In case of options coming from students of other departments/ branches/ disciplines (not considering **open electives**), first **priority** shall be given to the student of the '**parent department**'.

6.0 Attendance requirements:

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

semester. **Two periods** of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject.

6.2 Shortage of attendance in aggregate upto 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

6.3 A stipulated fee shall be payable for condoning of shortage of attendance.

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

6.5 **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled,** including all academic credentials (internal marks etc.) of that semester. **They will not be promoted to the next semester**. They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

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

7.0 Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in Item No. **6**.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks) in the Continuous Internal Evaluation (CIE), not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Mini Project (or) Internship (or) Technical Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time ResearchProject (or) Field Based Research Project (or) Mini Project (or) Internship (or) Technical Seminar evaluations.

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the

student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to Second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to Second year second semester	Regular course of study of second year first semester.
4	Second year second semester to Third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to Third year second semester	Regular course of study of third year first semester.
6	Third year second semester to Fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements

for 160 credits, (iii) earn all 160 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA ≥ 5 (at the end of 8 semesters), (iv) **secured satisfactory grade in all the mandatory courses,** to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA **(at the end of undergraduate programme),** and shall be indicated in the consolidated grade cum credit sheet.

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

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

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

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

8.0 Evaluation - Distribution and Weightage of Marks

8.1 The performance of a student in every subject/course (including practicals and Project Stage – I & II) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).

8.2 In CIE, for theory subjects, 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 20 marks with a total duration of 2 hours as follows:

1. Mid Term Examination for 30 marks:
   a. Part - A : Objective/quiz/short answer paper for 10 marks.
   b. Part - B : Descriptive paper for 20 marks.

The objective/quiz/short answer paper is set with multiple choice, fill-in the blanks, match the following type of questions and short answer questions for a total of 10

marks (10 questions). The descriptive paper shall contain6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The **average of the two Mid Term Examinations** shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

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

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).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

There is NO Computer Based Test (CBT)/onetime improvement test of mid examinations for R22 regulations.

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

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

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

8.3 For practical subjects 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.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the University.

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.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

8.4 The evaluation of courses having ONLY internal marks in I Year I Semester and II Year II Semester is as follows:

1. I Year I Semester course ***(ex., Elements of CE/ME/EEE/ECE/CSE etc)*:** The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external

evaluation. The studentis deemed to have failed, if he (i) is absent as per schedule, or (ii) secures less than 40% marks in this course.

For CSE/IT and allied branches the Continuous Internal Evaluation (CIE) will be for 50 marks. Each Mid-Term examination consists of two parts i) Part – A for 20 marks, ii) Part – B for 20 marks with a total duration of 2 hours.

Part A: Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks.

Part B: Descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.

The remaining 10 marks of Continuous Internal Evaluation are for Assignment (5 marks) and Subject Viva-Voce/PPT/Poster Presentation/ Case Study (5 marks) and the evaluation pattern will remain same as for other theory subjects.

For all other branches, the Continuous Internal Evaluation (CIE) will be for 50 marks. Out of the 50 marks for internal evaluation:

a) **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.**

b) **10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.**

c) **Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 15 marks.**

d) **The remaining 15 marks are for Laboratory Report/Project and Presentation, 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.**

2. II Year II Semester *Real-Time (or) Field-based Research Project* course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

8.5 There shall be Industry training (or) Internship (or) Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal in collaboration with an industry of their specialization. Studentsshall register for this immediately after II-Year II Semester Examinations and pursue itduring summer vacation/semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Mini Project shall be submitted in a report form and presented before the committee in III-year II semester before end semester examination. It shall be

evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Mini Project (or) Internship etc, Internal Supervisor and a Senior Faculty Member of the Department. There shall be **NO internal marks** for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal.

8.6 There shall be a **Technical Seminar** presentation in the VIII Semester. For the Technical Seminar, the student shall collect the information on a specialized topic related to his branch other than the Real-Time (or) Field-based Research Project/ Mini project/ Internship/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar supervisor and a senior faculty member from the department. The Technical Seminar will be evaluated for 100 marks.

8.7 The UG project shall be initiated at the end of the IV Year I Semester and the duration of the project work is one semester. The student must present Project Stage – I during IV Year I Semester before II Mid examinations, in consultation with his Supervisor, the title, objective and plan of action of his Project work to the departmental committee for approval before commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his project work.

8.8 UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

8.9 For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.10 For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20 marks and Project Supervisor shall evaluate for 20 marks. The topics for Mini Project/ Internship/SDC etc. and the main Project shall be different from the topic already taken. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and

SEE taken together.

For conducting viva-voce of project, The External Examiner shall be nominated by the Controller of Examinations from the panel of 3 names of external faculty members (Professors or Associate Professors outside the College) submitted by the HoD.

A student who has failed, may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.11 A student can re-register for subjects in a semester:

If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

They may seek re-registration for all those subjects registered in that semester in which the student is failed. The student has to re-appear for CIE and SEE as and when offered.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the classwork in next academic year. His Continuous Internal Evaluation marks for 40 obtained in the previous attempt stand cancelled. The student has to obtain fresh set of marks for 40 allotted for CIE (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject). Head of the Dept. will take care of this.

8.12 For mandatory courses, a student has to secure 40 marks out of 100 marks (i.e. 40% of the 100 marks allotted) in the Continuous Internal Evaluation for passing the subject/course.

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

9.0 Grading Procedure

9.1 Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/Practicals/ Mini Project/Internship/SDC and Project Stage. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student who has obtained an '**F**' grade in any subject shall be deemed to have '**failed**' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

9.4 To a student who has not appeared for an examination in any subject, '**Ab**' grade will be allocated in that subject, and he is deemed to have '**Failed**'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

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

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

Credit Points (CP) = Grade Point (GP) x Credits …. For a course

9.7 A student passes the subject/ course only when **GP ≥ 5 ('C' grade or above)**

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

$$\textbf{SGPA} = \{ \textstyle\sum_{i=1}^{N} C_i G_i \} / \{ \sum_{i=1}^{N} C_i \}$$ **…. For each semester**,

where 'i' is the subject indicator index (considering all subjects in a semester), 'N' is the no. of subjects '**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} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses (of 160) 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 II semester onwards at the end of each semester as per the formula

$$\textbf{CGPA} = \{ \textstyle\sum_{j=1}^{M} C_j G_j \} / \{ \sum_{j=1}^{M} C_j \} \textbf{ … for all S semesters registered}$$

(i.e., up to and inclusive of S semesters, S ≥ 2),

where '**M**' is the **total** no. of subjects (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from the 1^{st} semester onwards up to and inclusive of the 8^{th} semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	2	C	5	2 x 5 = 10
Course 4	3	B	6	3 x 6 = 18
Course 5	1	A+	9	1 x 9 = 9
Course 6	1	C	5	1 x 5 = 5
Course 7	1	O	10	1 x 10 = 10
Course 8	2	A	8	2 x 8 = 16
Course 9	1	B^+	7	1 x 7 = 7
Course 10	1	B^+	7	1 x 7 = 7
	20			154

SGPA = 154/20 = 7.7

Illustration of Calculation of CGPA up to 3rd Semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	4	A	8	32
I	Course 2	4	O	10	40
I	Course 3	2	B	6	12

I	Course 4	3	A	8	24
I	Course 5	1	A+	9	9
I	Course 6	1	C	5	5
I	Course 7	1	B	6	6
I	Course 8	2	A	8	16
I	Course 9	1	C	5	5
I	Course 10	1	O	10	10
II	Course 11	2	B+	7	14
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
II	Course 15	1	A	8	8
II	Course 16	1.5	C	5	7.5
II	Course 17	1.5	O	10	15
II	Course 18	1.5	B+	7	10.5
II	Course 19	1.5	B	6	9
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
III	Course 22	3	A	8	24
III	Course 23	3	O	10	30
III	Course 24	3	A	8	24
III	Course 25	2	C	5	10
III	Course 26	1	O	10	10
III	Course 27	1	B+	7	7
	Total Credits	**60**		**Total Credit Points**	**467**

CGPA = 467/60 = 7.78

The calculation process of CGPA illustrated above will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. programme.

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

9.11 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

10.0 Passing Standards

10.1 A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 (**'C'** grade or above) in every subject/course in that semester (i.e. when the student gets

an SGPA ≥ 5.0 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire undergraduate programme, only when gets a CGPA ≥ 5.00 (**'C'** grade or above) for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

11.0 Declaration of results

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

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

% of Marks = (final CGPA – 0.5) x 10

12.0 Award of Degree

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of B.Tech. degree in the branch of Engineering selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 A student with final CGPA (at the end of the undergraduate programme) ≥ 8.00, and fulfilling the following conditions - shall be placed in '**First Class with Distinction'**. However, he

(i) Should have passed all the subjects/courses in '**First Appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA ≥ 8 shall be placed in **'First Class'.**

12.4 Students with final CGPA (at the end of the undergraduate programme) ≥ 7.0 but < 8.00 shall be placed in **'First Class'.**

12.5 Students with final CGPA (at the end of the undergraduate programme) ≥ 6.00 but < 7.00, shall be placed in '**Second Class'**.

12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 6, shall be placed in '**pass class**'.

12.7 A student with final CGPA (at the end of the undergraduate programme) < 5.00 will not be eligible for the award of the degree.

12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**Gold Medal**'.

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

1. A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) upto B.Tech. II Year II Semester, if the student want to exit the 4-Year B.Tech. program and *requests for the 2 -Year* B. Tech. (*UG) Diploma Certificate.*

2. The student **once opted and awarded 2-Year UG Diploma Certificate, the student will be permitted to join** in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree ONLY in the next academic year along with next batch students. *However, if any student wishes to continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of classwork for that semester.*

3. The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. program, must submit the 2 -Year B. Tech. (*UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.*

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

13.0 Withholding of results

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

14.0 Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student who has been detained in any semester of II to VIII semesters of R18 regulations for want of attendance, shall be permitted to join the corresponding

semester of R22 Regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The R22 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

3. A student of R18 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of R22 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in R22 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.
5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R22 Regulations. **There is NO exemption of credits in any case**.
6. If a student is readmitted to R22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the Board of Studies.
7. The total credits required are 160 including both R18 & R22 regulations, and if the total credits are less than 160 including both R18 & R22 Regulations then an additional course(s) suggested by the Board of Studies may be given to fulfill the minimum requirements of 160 credits.

Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, the remedial classes shall be conducted to cover those subjects/topics for the benefit of the students.

15.0 Student Transfers

15.1 There shall be no Branch transfers after the completion of Admission Process.

15.2 Transfer of candidates from other Institutions will be governed by the regulations of Telangana State Government issued from time to time.

15.3 The students seeking transfer to colleges affiliated to JNTUH from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of JNTUH, and also pass the subjects of JNTUH which the students have not studied at the earlier institution. Further, though the students have passed some of the

subjects at the earlier institutions, if the same subjects are prescribed in different semesters of JNTUH, the students have to study those subjects in JNTUH in spite of the fact that those subjects are repeated.

15.4 The transferred students from other Universities/Institutions to JNTUH affiliated colleges who are on rolls are to be provided one chance to write the CBT (for internal marks) in the equivalent subject(s) as per the clearance letter issued by the University.

15.5 The autonomous affiliated colleges have to provide one chance to write the internal examinations in the equivalent subject(s) to the students transferred from other universities/institutions to JNTUH autonomous affiliated colleges who are on rolls, as per the clearance (equivalence) letter issued by the University.

16.0 Scope

i) Where the words "he", "him", "his", occur in the write-up of regulations, they include "she", "her", "hers".

ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

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

iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal/College Academic Council/Honourable Vice-Chancellor of JNTUH is final.

v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

****

ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

(Applicable for the students admitted into II Year B.Tech (Lateral Entry Scheme) from the Academic Year 2023-24 and onwards)

1. Eligibility for the award of B.Tech Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 24 credits out of 40 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. **All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).**

7. **LES students are not eligible for 2-Year B. Tech. Diploma Certificate.**

****

MALPRACTICE RULES

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/ Improper conduct	Punishment
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers, smart watches, electronic gadgets or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
(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, pager, palm computers, smart watches, electronic gadgets with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers, cell phones, smart watches, electronic gadgets or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations excluding Project work/ Mandatory Courses /Technical Seminar and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate Who has been

		impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles 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	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	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	Cancellation of the performance in that subject
6.	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 or organizes a walk out or instigates others **to** examination hall-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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	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.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester End Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of That semester/year. The candidate is also debarred and forfeits the seat.
9.	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.	If the student belongs to the college, expulsion from the examination performance in that subject and all other subjects shall and cancellation of the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a state of inebriated/drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during	Cancellation of the performance in that subject and all other subjects the

	special scrutiny.	candidate has appeared including practical examinations excluding Project work/ Mandatory Courses /Technical Seminar of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

1) The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center. Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.
4) Based on the explanation and recommendation of the committee action may be initiated.

Malpractice committee:

(a) Chief Superintendent	Chairman
(b) Controller of Examinations	Member
(c) Dean Academics	Member
(d) Chief Examiner of the Course/ Subject Expert	Member
(e) Concerned Head of the Department	Member
(f) Observer	Member

******

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B. Tech- CSE (Cyber Security)

CBCS & OUTCOME BASED COURSE STRUCTURE & SYLLABUS

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

Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P	C	CIE	SEE
A400101	English for Skill Enhancement	HSMC	2	0	0	2	40	60
A400001	Matrices and Calculus	BSC	3	1	0	4	40	60
A400008	Applied Physics	BSC	3	1	0	4	40	60
A405201	Programming for Problem Solving	ESC	3	0	0	3	40	60
A400503	English Language and Communication Skills Laboratory	HSMC	0	0	2	1	40	60
A400501	Applied Physics Laboratory	BSC	0	0	3	1.5	40	60
A405501	Elements of Computer Science & Engineering	ESC	0	0	2	1	50	-
A405504	IT Workshop	ESC	0	0	3	1.5	40	60
A405502	Programming for Problem Solving Laboratory	ESC	0	0	2	1	40	60
A400505	Introduction to Social Innovation	HSMC	0	0	2	1	40	60
A400704	Universal Human Values	MC	2	0	0	0		
Total:			13	2	14	20		
Total hours per Week:						29		

SEMSETER -II

Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P	C	CIE	SEE
A400002	Ordinary Differential Equations and Vector Calculus	BSC	3	1	0	4	40	60
A400009	Engineering Chemistry	BSC	3	1	0	4	40	60
A405301	Data Structures	PCC	3	0	0	3	40	60
A402201	Basic Electrical Engineering	ESC	2	0	0	2	40	60
A403502	Computer Aided Engineering Drawing	ESC	0	1	2	2	40	60
A400502	Engineering Chemistry Laboratory	BSC	0	0	2	1	40	60
A405505	Data Structures Laboratory	PCC	0	0	3	1.5	40	60
A402502	Basic Electrical Engineering Laboratory	ESC	0	0	2	1	40	60
A400506	Engineering Exploration & Practice	HSMC	0	0	3	1.5	40	60
A400703	Constitution of India	MC	2	0	0	0	-	-
Total:			13	3	12	20		
Total hours per Week:						28		
Total Credits in I year :40								

SEMESTER – III								
Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P		CIE	SEE
A405306	Discrete Mathematics	PCC	3	0	0	3	40	60
A404204	Digital Electronics	ESC	3	0	0	3	40	60
A404203	Electronic Devices and Circuits	ESC	2	0	0	2	40	60
A405304	Database Management Systems	PCC	3	0	0	3	40	60
A405303	Object Oriented Programming through Java	PCC	3	0	0	3	40	60
A405508	Database Management Systems Laboratory	PCC	0	0	3	1.5	40	60
A405507	Object Oriented Programming through Java Laboratory	PCC	0	0	3	1.5	40	60
A405506	Python Programming Laboratory	ESC	0	1	2	2	40	60
A400507	Skill Development Course (Data Visualization-R Programming /Social Innovation in Practice)	PCC	0	0	2	1	40	60
A400701	Environmental Science	MC	2	0	0	0	40	60
Total:			16	1	10	20		
Total hours per Week:			27					

SEMESTER – IV								
Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P		CIE	SEE
A400006	Computer Oriented Statistical Methods	BSC	3	1	0	4	40	60
A405305	Operating Systems	PCC	3	0	0	3	40	60
A405307	Computer Organization and Architecture	PCC	3	0	0	3	40	60
A462301	Computer Networks	PCC	3	0	0	3	40	60
A462302	Cyber Security Essentials	PCC	3	0	0	3	40	60
A405509	Operating Systems Laboratory	HSMC	0	0	2	1	40	60
A462501	Computer Networks Laboratory	PCC	0	0	2	1	40	60
A400702	Gender Sensitization	MC	0	0	2	0	-	-
A462801	Real-Time Research Project/Field Based Project	PROJ	0	0	4	2	40	60
Total:			15	1	10	20		
Total hours per Week			26					

Total Credits in I year : 40								

SEMESTER – V

Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P		CIE	SEE
A462303	Network Security and Cryptography	PCC	3	1	0	4	40	60
A462304	Algorithm Design and Analysis	PCC	3	0	0	3	40	60
A462305	Cyber Crime Investigation & Digital Forensics	PCC	3	0	0	3	40	60
A462306	Formal Languages and Automata Theory	PCC	3	0	0	3	40	60
A4624xx	Professional Elective- I	PEC	3	0	0	3	40	60
A462502	Network Security and Cryptography Laboratory	PCC	0	0	2	1	40	60
A462503	Cyber Crime Investigation and Digital Forensics Laboratory	PCC	0	0	2	1	40	60
A462504	Cyber Security Essentials Laboratory	PCC	0	0	2	1	40	60
A400705	Intellectual property rights	*MC*	2	0	0	0	-	-
A462505	Skill development Course (UI design- Flutter)	PCC	0	0	2	1	40	60
	Total:		17	1	8	20		
	Total hours per Week:		26					

SEMESTER – VI

Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
			L	T	P		CIE	SEE
A462307	Software Engineering	PCC	3	0	0	3	40	60
A462308	Vulnerability Assessment and Penetration Testing	PCC	3	0	0	3	40	60
A462309	Network Management Systems and Operations	PCC	3	0	0	3	40	60
A462310	Compiler Design	PCC	2	0	0	2	40	60
A4624xx	Professional Elective-II	PEC	3	0	0	3	40	60
A462506	Compiler Design Laboratory	PCC	0	0	2	1	40	60
A462507	Vulnerability Assessment and Penetration Testing Laboratory	PCC	0	0	2	1	40	60
A462508	Network Management Systems and Operations Laboratory	PCC	0	0	2	1	40	60
A400504	Advanced English Communication Laboratory	HSMC	0	0	2	1	40	60
A462802	Industrial Oriented Mini Project/ Summer Internship/Skill Development Course (Big data-Spark)	PROJ	0	0	4	2	-	100
	Total:		14	0	12	20		

Total hours per Week		**26**				
Total Credits in III Year: 40						

SEMESTER – VII								
Course Code	**Course Title**	**Category**	**Hours per Week**			**Credits**	**Maximum Marks**	
			L	**T**	**P**		**CIE**	**SEE**
A400102	**Business Economics & Financial Analysis**	**HSMC**	**3**	**0**	**0**	**3**	**40**	60
A400103	**Organizational Behavior**	**HSMC**	**2**	**0**	**0**	**2**	**40**	60
A4624xx	**Professional Elective-III**	**PEC**	**3**	**0**	**0**	**3**	**40**	60
A4624xx	**Professional Elective-IV**	**PEC**	**3**	**0**	**0**	**3**	**40**	60
A4624xx	**Professional Elective- V**	**PEC**	**3**	**0**	**0**	**3**	**40**	60
A4626xx	**Open Elective-I**	**OEC**	**3**	**0**	**0**	**3**	**40**	60
A462803	**Project Phase-I**	**PROJ**	**0**	**0**	**6**	**3**	**40**	60
	Total:		**17**	**0**	**10**	**20**		
	Total hours per Week:		**27**					

SEMESTER – VIII								
Course Code	**Course Title**	**Category**	**Hours per Week**			**Credits**	**Maximum Marks**	
			L	**T**	**P**		**CIE**	**SEE**
A4624xx	**Professional Elective- VI**	**PEC**	**3**	**0**	**0**	**3**	**40**	**60**
A4626xx	**Open Elective-II**	**OEC**	**3**	**0**	**0**	**3**	**40**	**60**
A4626xx	**Open Elective-III**	**OEC**	**3**	**0**	**0**	**3**	**40**	**60**
A462804	**Technical Seminar**	**PROJ**	**0**	**0**	**4**	**2**	**100***	
A462805	**Project Phase –II**	**PROJ**	**0**	**0**	**18**	**9**	**40**	**60**
	Total:		**9**	**0**	**22**	**20**		
	Total hours per Week		**31**					
Total Credits in IV Year: 40								

List of Professional Electives	
Professional Elective-I	
A462401	Artificial Intelligence
A462402	Data warehousing and Data Mining
A462403	Ad-hoc & **Sensor** Networks
A462404	Cyber Laws
Professional Elective-II	
A462405	Mobile And Wireless Security
A462406	Ethical Hacking
A462407	Cyber Forensics
A462408	Cloud Computing
Professional Elective-III	
A462409	Data Privacy
A462410	Machine Learning
A462411	IoT Security
A462412	Blockchain Technology
Professional Elective-IV	
A462413	Edge Analytics
A462414	Web & Database Security
A462415	Computer Security & Audit Assurance
A462416	Social Media Security
Professional Elective-V	
A462417	Data Analytics for Fraud Detection
A462418	5G Technologies
A462419	Security Incident & Response Management (SOC)
A462420	Authentication Techniques
Professional Elective-VI	
A462421	IoT Cloud Processing and Analytics
A462422	Cloud Security
A462423	Digital Watermarking and Steganography
A462424	Mobile Application Security

Open Elective-I		
Sr.No	Course Code	Course Name
1	A404601	Fundamentals of Internet of Things
2	A404602	Principles of Digital Signal Processing
3	A402601	Renewable Energy Sources
4	A402602	Basics of Power Electronics & Drives
5	A405604	Java Programming
6	A405602	Fundamentals of Operating Systems
7	A403601	Fundamentals of Engineering Materials
8	A403602	Basics of Thermodynamics
9	A400601	Basics of Logistics and Supply Chain Management
10	A400602	Industrial Relations
11	A401601	Disaster Preparedness & Planning Management
12	A401602	Environmental Impact Assessment
Open Elective-II		
1	A404603	Sensors and Transducers
2	A404604	Image Processing
3	A402603	Electrical Vehicle Technology
4	A402604	Basics of Power Plant Engineering
5	A405601	Fundamentals of Database management Systems
6	A405605	Web programming
7	A403603	Fundamentals of Manufacturing Processes
8	A403604	Fundamentals of Automobile Engineering
9	A400603	Entrepreneurship
10	A400604	Ethics in Business & Corporate Governance
11	A401603	Remote Sensing & Geographical Information Systems
12	A401604	Solid Waste Management
Open Elective-III		
1	A404605	Fundamentals of Embedded Systems
2	A404606	Data Communications
3	A402605	Nano Technology
4	A402606	EV Batteries & Charging System
5	A405603	Fundamentals of Computer networks
6	A405606	Fundamentals of DevOps
7	A403605	Industrial safety Engineering
8	A403606	Waste to Energy
9	A400605	Basics of Marketing
10	A405607	Cloud Computing
11	A401605	Energy Efficient Buildings
12	A401606	Environmental Pollution

(A400101) ENGLISH FOR SKILL ENHANCEMENT

(Common to all branches)

B. Tech: I Semester

L	T	P	C
2	0	0	2

UNIT – I

Chapter entitled 'Toasted English' by R.K. Narayan from "English: Language, Context and Culture" published by Orient Black Swan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes -Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives -Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph Writing – Types, Structure and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II

Chapter entitled 'Appro JRD 'by Sudha Murthy from "English Language, Context and Culture" published by Orient Black Swan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning

UNIT – III

Chapter entitled 'Lessons from Online Learning' by F. Haider Alvi, Deborah Hurst et al from "English: Language, Context and Culture" published by Orient Black Swan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled 'Art and Literature' by Abdul Kalam from "English: Language, Context and Culture" published by Orient Black Swan, Hyderabad.

Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oraland Written Communication.
Reading: Writing: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice Writing Practices
Essay Writing-Writing Introduction and Conclusion -Précis Writing

UNIT – V
Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading: Writing: Reading Comprehension-Exercises for Practice Technical Reports-Introduction.

NOTE:

Listening and Speaking Skills which are given under in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- NOTE 1: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First-year is Open- ended, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- NOTE 2: Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXTBOOK:

1. "English: Language, Context and Culture" by Orient Black Swan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing, (2nd edition) by Liss and Davis (OUP)2014.
2. Richards, Jack C. Interchange Series. Introduction, ,(4th edition), Cambridge University Press 2022
3. Remedial English Grammar by Wood F.T, Macmillan.2007.
4. Learn English: A Fun Book of Functional Language, Grammar and Vocabulary, (2ndedition) Chaudhuri, Santamaria, Sage Publications India Pvt. Ltd.2018
5. Technical Communication, (1st edition), Wiley India Pvt. Ltd.2019
6. English for Technical Communication for Engineering, Vishwa Mohan, Aysha 2013

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written Communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known passages.
5. Acquire basic proficiency in reading and writing modules of English and take an Active part in drafting paragraphs, letters, essays, abstracts, precis, and reports in Various contexts.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-
CO2	-	-	-	-	-	-	-	-	-	**2**	-	-
CO3	-	-	-	-	-	-	-	-	-	**2**	-	-
CO4	-	-	-	-	-	-	-	-	-	**3**	-	**2**
CO5	-	-	-	-	-	-	-	-	-	**2**	-	**3**

****END****

(A400001) MATRICES AND CALCULUS
(Common to All Branches)

B. Tech: I Semester

L	T	P	C
3	1	0	4

UNIT-I

Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous equations and non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II

Eigen values and Eigen vectors:

Linear Transformation and Orthogonal transformation: Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) -Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT-III

Calculus:

Mean value theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),

Improper Integral: Beta, Gamma functions and their applications.

UNIT-IV

Multivariable calculus (Partial Differentiation and applications):

Partial differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V

Multivariable Calculus (Integration):

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

TEXTBOOKS:

1. Higher Engineering Mathematics, (36thEdition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5thEdition), R.K. Jain and S.R.K Iyengar, NarosaPublications,2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwinkreyszig, John Wiley & Sons,2006.

2. Calculus and Analytic geometry, (9thEdition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A textbook of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11thReprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Solve linear system of equations represented by matrices
2. Obtain eigen values, eigen vectors and perform diagonalization of a square matrix.
3. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions.
4. Develop the skill of determining optimal values of multivariable functions using classical methods.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	-	-	-	-	-	-	-	2
CO2	3	2	3	2	-	-	-	-	-	-	-	2
CO3	2	3	2	2	-	-	-	-	-	-	-	2
CO4	3	2	3	3	-	-	-	-	-	-	-	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3

****END****

(A400008) APPLIED PHYSICS
(Common to all branches)

B. Tech: I Semester

L	T	P	C
3	1	0	4

UNIT – I

QUANTUM MECHANICS:

Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect – de Broglie hypothesis-Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

ELECTRIC PROPERTIES OF SOLIDS:

Free electron theory (Drude& Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands-classification of solids.

UNIT – II

SEMICONDUCTORS AND DEVICES:

Intrinsic and extrinsic semiconductors, Variation of Fermi level with temperature – Hall Effect - Construction, principle of operation and characteristics of P-N Junction diode, Zener diode

PHOTONIC DEVICES

Direct and indirect band gap semiconductors –LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT – III

LASERS-Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO2 laser - semiconductor laser-applications of laser.

FIBER OPTICS: Introduction to optical fibre - advantages of optical fibres - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

UNIT - IV

DIELECTRIC MATERIALS

Dielectric Materials: Basic definitions- types of polarizations (qualitative) –Local field – Clasius Mossoti Equation ferroelectric, piezoelectric, and pyroelectric materials – applications

MAGNETIC MATERIALS

Introduction to magnetic materials - Hysteresis-soft and hard magnetic materials-magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.

UNIT - V

ENERGY MATERIALS:

Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapour deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

TEXTBOOKS

1. Engineering Physics (3rd edition), PK Palanisamy, SciTech Publications, 2015.
2. Essentials of Nan science Nano technology (1st Edition), Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 2021.

REFERENCES

1. Fundamentals of Physics. (6^{th} edition), Halliday, R.Resnick and J.Walker,John Wiley and Sons, 2001.
2. Quantum Physics, (2^{nd} edition), H.C. Verma, TBS Publication, 2012
3. Introduction to Solid State Physics, (7^{th} edition), Charles Kittel, Wiley Eastern, 2019.

COURSE OUTCOMES On completion of the course students will be able to

1. Understand the concepts of Quantum mechanics and visualize the differences between the solids by their classification.
2. Identify and analyse the importance of semiconductors and semiconductor devices in science. and Engineering Applications.
3. Appreciate the features and applications of Lasers and Optical fibres.
4. Applying the fundamental properties of dielectric and magnetic materials in different engineering fields.
5. Evaluate various aspects of Energy Materials and Nano - materials and their applications in diverse fields.

CO-PO MAPPING TABLE

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	-	-	-	-	-	-	1
CO2	3	3	2	1	1	1	1	-	-	1	-	2
CO3	3	3	2	1	1	1	1	-	-	1	-	2
CO4	3	3	2	1	1	-	-	-	-	1	-	1
CO5	3	3	2	1	1	1	1	1	-	1	-	2

END

(A405201) PROGRAMMING FOR PROBLEM SOLVING
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech: I Semester

L	T	P	C
3	0	0	3

UNIT-I

Representation of Algorithm: Algorithms for simple task, decision making task like finding maximum numbers of a given set and repetitive task like sum of numbers, Flowchart/Pseudo code with examples, Introduction to C Programming Language: Simple C Programs, Desirable Program Characteristics. C Character Set, Identifiers and Keywords, Data Types, Constants, Variables, Expressions.

Operators and Expressions: Unary Operators, Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Conditional Operator, Assignment Operators, Special Operators, Precedence & Associatively of Operators, Evaluation of Expressions.

Data Input and Output: Preliminaries, Single Character Input- The get char Function, Single Character Output- The putchar Function, Entering Input Data- The scanf Function, More About the scanf Function, Writing Output Data- The printf Function, More About the printf Function, the gets and puts Functions.

UNIT-II

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch- case, ternary operator, goto, Iteration with for, while do- while loops I/O: Simple input and output with scanf and printf, formatted I/O,

Arrays: one-and two-dimensional arrays, creating, accessing, and manipulating of arrays

UNIT-III

Functions: Defining a Function, accessing a Function, declaring a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries, Storage classes (auto, extern, static and register).

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

UNIT-IV

Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) **Enumeration data type Dynamic memory allocation:** Allocating and freeing memory, Allocating memory for arrays of different data types.

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

UNIT-V

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions, Command line arguments. Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

Textbooks

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson

COURSE OUTCOMES

On completion of the course students will be able to

1. Describe the structure of C-program and use iterative and decision control statements for developing solutions to computational problems.
2. Organize data in Arrays, structures and perform operations on data stored in Arrays.
3. Design and develop modular solutions using C-functions and allocate memory dynamically for variables.
4. Create and manipulate C-File structures and use preprocessing directives to control C source code.
5. Compare and contrast various searching and sorting strategies.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**3**	**2**	**3**					**1**	**1**	**2**
CO2	**1**	**3**	**2**		**2**							
CO3	**1**	**2**	**3**	**2**								
CO4	**1**	**1**	**3**		**3**							
CO5		**3**	**2**		**2**						**1**	**1**

****END****

(A400503) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY
(Common to all branches)

B. Tech: I Semester I

L	T	P	C
0	0	2	1

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts. English Language and **Communication Skills Lab (ELCS) shall have two parts:**

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills Objectives

1. To enable students, develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

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

Speaking Skills Objectives

1.To involve students in speaking activities in various contexts.
2.To enable students to express themselves fluently and appropriately in social and professional.

- Oral practice.
- Describing objects/situations/people.
- Role play – Individual/Group activities.
- Just A Minute (JAM) Sessions.

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

Exercise – I

CALL Lab: Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Past Tense Marker and Plural Marker- Testing Exercises.

ICS Lab: Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab: Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms– Stress pattern in sentences. –Intonation. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences–Intonation - Testing Exercises.

ICS Lab: Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etique.

Exercise – III

CALL Lab: Understand: Errors in Pronunciation-Neutralizing Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises.

ICS Lab: Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog **Writing Practice:** Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab: Understand: Listening for General Details. Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab: Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication Presentation Skills. Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab: Understand: Listening for Specific Details. Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab: Understand: Group Discussion Practice: Group Discussion.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1.Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students. System Requirement (Hardware component): Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications: i) Computers with Suitable Configuration ii) High Fidelity Headphones.

2.Interactive Communication Skills (ICS) Lab: The Interactive Communication **Skills Lab:** A Spacious room with movable chairs and audiovisual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc. Source of Material (Master Copy): • Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Lab Manual:
A workbook for CALL & ICS lab activity. Prepared by JNTUH, orient black swan

REFERENCE BOOKS:

1. English Language Communication Skills Lab Manual cum Workbook, (1st edition), by Rajesh Kumar Cengage Learning India Pvt. Ltd,2022.
2. Communicative English - A workbook, (Revised Edition) by Shobha, KN &Rayen, J. Lourdes, Cambridge University Press, 2019.
3. Communication Skills: A Workbook. Kumar, (2nd edition) by Sanjay &Lata, Pushp, Oxford University Press, 2019.
4. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities, (Board of Editors), Orient Black Swan Pvt. Ltd, 2016.
5. English Language Skills: A Practical Approach, Mishra, Veerendra et al., Cambridge University Press,2020.

COURSE OUTCOMES:
On completion of the course students will be able to

1. Understand the nuances of English language through audio- visual experience and group activities.
2. Neutralize their accent for intelligibility.
3. Speak with clarity and confidence which in turn enhances their employability skills.
4. Students will learn public speaking skills and overcome stage fear.
5. Express clarity of thoughts, capability to hold the discussion with everyone and develop analytical thinking.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	**2**	-	-
CO2	-	-	-	-	-	-	-	-	-	**2**	-	-
CO3	-	-	-	-	-	-	-	-	-	**3**	**2**	-
CO4	-	-	-	-	-	-	-	-	-	**3**	-	**2**
CO5	-	-	-	-	-	-	-	-	-	**2**	-	**2**

****END****

(A400501) APPLIED PHYSICS LABORATORY

B. Tech: I Semester

L	T	P	C
0	0	3	1.5

(Any 8 experiments are to be performed)

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. a) V-I and L-I characteristics of light emitting diode (LED) b) V-I Characteristics of solar cell.
6. Determination of Energy gap of a semiconductor.
7. Determination of the resistivity of semiconductors by two probe method.
8. Study of B-H curve of a magnetic material.
9. Determination of dielectric constant of a given material.
10. a) Determination of the beam divergence of the given LASER beam) Determination of Acceptance Angle and Numerical Aperture of an optical fibre.
11. Understanding the method of least squares – torsional pendulum as an example.
12. Diffraction grating: Determination of wavelength of a source (LASER).

LABORATORY MANUAL:

1. Applied Lab (2nd Edition) Dr M Chandra Shekhar Reddy, Dr Neelima Patnaik, Jaya Prakash Reddy Kasu, Skytech Publications, 2022.
2. "A Textbook of Practical Physics" (2nd Edition) - S. Balasubramanian, M.N. Srinivasan S Chand Publishers, 2017.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Appreciate quantum physics in optoelectronics.
2. Determine the Planck's constant using Photo electric effect.
3. Determine energy gap of a semiconductor diode and magnetic fields.
4. Identify the material whether it is n-type or p-type by Hall experiment.
5. Evaluate the basic properties of lasers and optical fibers.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	-	-	1	-	1
CO2	3	3	2	1	-	-	-	-	-	1	-	1
CO3	3	3	2	1	-	-	1	-	-	1	-	1
CO4	3	3	2	1	-	-	-	-	-	1	-	1
CO5	3	3	2	1	-	-	1	-	-	1	-	1

****END****

(A405501) ELEMENTS OF COMPUTERSCIENCE AND ENGINEERING
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech: I Semester

L	T	P	C
0	0	2	1

UNIT–I

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software –systems software, application software, packages, frameworks, IDEs.

UNIT–II

Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development–steps in program development, flowcharts, algorithms, data structures– definition, types of data structures.

UNIT–III

Operating systems: Functions of operating systems, types of operating systems, Device & Resource management.

Database Management Systems: Data models, RDBMS, SQL, Database Transactions, data centers, cloud services.

UNIT–IV

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, Wi-Fi, sensor networks, vehicularnetworks,5Gcommunication.

Worldwide Web–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyberlaws.

UNIT–V

Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing.

Cloud Basics.

TEXTBOOK:

1.Invitation to Computer Science, Michael Schneider, Macalester College, Judith. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCEBOOKS:

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, PeterNorton,8thEdition, Tata Mc Graw Hill.
3. Computer Fundamentals, Anita Goel, PearsonEducationIndia,2010.
4. Elements of computer science, Cengage.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Know the working principles of functional units of a basic Computer.
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the needs and types of operating system, database systems.
4. Understand the significance of networks, internet, WWW and cyber security.
5. Understand Autonomous systems, the application of artificial intelligence.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**											**2**
CO2	**3**		**2**									**2**
CO3	**3**		**2**									**2**
CO4	**3**		**1**			**1**		**2**				**2**
CO5	**3**	**1**	**2**		**2**							**2**

****END****

(A405504) IT WORKSHOP
(Common to CSE, ECE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech I Semester

L	T	P	C
0	0	3	1.5

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 2: Calculating GPA - Features to be covered: - Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP.

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

PowerPoint

Task 1: Students will be working on basic power point utilities and tools which help them create basic PowerPoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

Textbooks:

1. Comdex Information Technology Course tool kit _Vikas Gupta WILEY Dreamtech

REFERENCE BOOK:

1. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dream tech.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft).
4. LaTeX Companion – Leslie Lamport, PHI/Pearson.
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
6. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan– CISCO Press, Pearson Education.

COURSE OUTCOMES

On completion of the course students will be able to

1. Identify various hardware components of a system and their significances.
2. Assemble and disassemble the computer.
3. Use various Microsoft tools for text processing, visual presentations, and number crunching.
4. Retrieve the information from Internet using web browsers.
5. Safeguard the system from external and internal threats

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2			1					1
CO2	3			2	2	1						1
CO3					3					2		2
CO4		2		2	3	1		1		2		2
CO5					3	3	2	2				3

****END****

(A405502) PROGRAMMING FOR PROBLEM SOLVING LABORATORY
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech: I Semester

L	T	P	C
0	0	3	1.5

[Note: The programs may be executed using any available Open Source/ Freely available IDE. Some of the Tools available are:
Code Lite: https://codelite.org/
Code: Blocks: http://www.codeblocks.org/
Dev Cpp: http://www.bloodshed.net/devcpp.htm--l Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference.

I.OPERATORS AND EVALUATION OF EXPRESSIONS

Demonstration

1. Write a C program to print greetings message on the screen.

2. Write a C program to illustrate usage of comments in C.

3. Write a simple program that prints the results of all the operators available in C (Including pre/post increment, bitwise and/or/not. etc.). Read required operand values from standard input.

4. Write a C program that converts given data type to another using auto conversion and casting. Take the values from standard input.

5. Write a program for finding the max and min from the three numbers (using ternary operator).

Experiment

6.Write a C program to compute simple, compound interest.

7.Write a C Program that declares Class awarded for a given percentage of marks, where mark = 70% = Distinction. (Read percentage from standard input)

8.Write a C Program that prints a multiplication table for a given number and the number of rows in the table. (For example, for a number 5 and rows = 3, the output should be: 5 x 1 = 5, 5 x 2 = 10, 5 x 3 = 15….

9.Write a program that shows the binary equivalent of a given positive number between 0 to 255.

10.Write a program that asks the user to enter the total time elapsed, in seconds, since an event and converts the time to hours, minutes and seconds. The time should be displayed as hours: minutes: seconds. [Hint: Use the remainder operator].

II. Expression Evaluation Demonstration

1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2) at2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec2 (= 9.8 m/s2)).
2. Write a program that asks the user to enter the highest rainfall ever in one season for a country, and the rainfall in the current year for that country, obtains the values from the user, checks if the current rainfall exceed the highest rainfall and prints an appropriate message on the screen. If the current rainfall is higher, it assigns that value as the highest rainfall ever. Use only the single-selection form of the if statement.

3. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement).

4. Write a program that finds if a given number, is a prime number.

5. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

6. Write a program that reads the radius of a circle (as a float value) and computes and prints the diameter, the circumference, and the area. Use the value 3.14159 for π.

7.Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

Experiment

9. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

10. Write a C program to find the roots of a Quadratic equation.

III. Iterative statements Demonstration

1.Input an integer (5 digits or fewer) containing only 0s and 1s (i.e., a “binary” integer) and print its decimal equivalent. [Hint: Use the remainder and division operators to pick off the “binary” number’s digits one at a time from right to left. Just as in the decimal number system, in which the rightmost digit has a positional value of 1, and the next digit left has a positional value of 10, then 100, then 1000, and so on, in the binary number system the rightmost digit has a positional value of 1, the next digit left has a positional value of 2, then 4, then 8, and so on. Thus, the decimal number 234 can be interpreted as 4 * 1+ 3 * 10 + 2 * 100. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8 or 1 + 0 + 4 +8 or 13].

2. Armstrong numbers are numbers that are equal to the sum of their digits raised to power of the number of digits in them. The number 153, for example, equals 13 + 53 + 33. Thus, it is an Armstrong number. Write a program to display all three- digit Armstrong numbers.

3. Write a program that reads an integer (5 digits or fewer) and determines and prints how many digits in the integer are 9s.
4. Write a program that keeps printing the powers of the integer 3, namely 3, 9, 27, 91, 273, and so on. Your loop should not terminate (i.e., you should create an infinite loop). What happens when you run this program?

5. Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x2/4-x3/6 ……

6. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+……+xn. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

7. Write a C program to construct a pyramid of numbers as follows:

```
1                       1
1   2                   2   2
1   2   3               3   3   3
1   2   3   4           4   4   4   4
1   2   3   4   5   5   5   5   5   5
```

Experiment

8. Write a program that reads three nonzero integer values and determines and prints whether they could represent the sides of a triangle.

9. Write a program that reads three nonzero integers and determines and prints whether they could be the sides of a right triangle.

10. Write a program that reads a nonnegative integer and computes and prints its factorial.

11. Write a program that estimates the value of the mathematical constant e by using the formula.

$$e^1 = 1 + \frac{1}{1!} + \frac{1^2}{2!} + \frac{1^3}{3!} + \cdots$$

12. Write a program that computes the value of ex by using the formula.

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots, -\infty < x < \infty$$

IV. Arrays, Pointers, and Functions Demonstration

1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
3. Write a C program that uses functions to perform the following:

i. Addition of Two Matrices ii. Multiplication of Two Matrices iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
4. Write C programs that use both recursive and non-recursive functions.
5. To find the factorial of a given integer.

Experiment

6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to compute x^n.
8. Write a program for reading elements using a pointer into an array and display the values using the array.
9. Write a program for display values reverse order from an array using a pointer.
10. Write a program through a pointer variable to sum of n elements from an array.

V. Files

Demonstration

1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

Experiment

3. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.

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

VI.Strings

Demonstration

1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent c.
3. Write a C program that uses functions to perform the following operations:
    - To insert a sub-string into a given main string from a given position.
    - To delete n Characters from a given position in a given string.

Experiment

4. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

5. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch..
6. Write a C program to count the lines, words and characters in each text.

VII. Sorting and Searching:

1. Write a C program that uses non recursive function to search for a key value in each list of integers using linear search method.
2. Write a C program that uses non recursive function to search for a key value in each sorted list of integers using binary search method.
3. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Experiment

4. Write a C program that sorts the given array of integers using selection sort in descending order.
5. Write a C program that sorts the given array of integers using insertion sort in ascending order.
6. Write a C program that sorts a given array of names.

Project

Students must submit a report on one of the following micro-projects before commencement of second internal examination.

1. Library management system.
2. Payroll management system.
3. Telecom billing management system.
4. Bank management system.
5. Employee's management system.
6. Library management system.
7. Personal Diary management system.
8. Medical store management system.
9. Phone Contacts Management.
10. Fee Collection System.

TEXTBOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.

2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI.
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.

3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
4. R.G. Dromey, how to solve it by Computer, Pearson (16th Impression).
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

On completion of the course students will be able to

1. Formulate the algorithms for simple problems and translate given algorithms to a working and correct program.
2. Correct syntax errors as reported by the compilers identify and correct logical errors encountered during execution.
3. Represent and manipulate data with arrays, strings and structures and use pointers of different types.
4. Create, read and write to and from simple text and binary files.
5. Develop reusable code with the help of C-functions.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**2**	**1**							
CO2			**3**	**3**	**1**						**2**	**2**
CO3	**3**	**3**		**2**	**2**							
CO4			**3**								**2**	
CO5	**2**	**2**	**3**								**1**	**1**

****END****

(A400505) INTRODUCTION TO SOCIAL INNOVATION
(Common to all branches)

B. Tech: I Semester

L	T	P	C
0	0	2	1

WEEK-1
Types and features of community- Rural, Suburban, Urban and Regional.

WEEK-2
Service based learning, Aims of Community based projects, Sustainable Development Goals.

WEEK-3
Community visit, Report Writing, Resource Diagram, Chapati Diagram, Transect Walk.

WEEK-4
The non-profit sector, public sector, the private sector, the informal sector.

WEEK-5
Poster presentation on four sectors.

WEEK-6
Process of Design Thinking.

WEEK-7
Social organizations and enterprises, social movements.

WEEK-8
Social software and open-source methods.

WEEK-9
Introduction to Ethics, moral values, significance of professional ethics code of conduct for engineers.

WEEK-10
Identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.

WEEK-11
Case studies on Engineering Ethics.

WEEK-12
Documentation, Steps for Patent filing and Startups, Poster presentation.

Textbooks

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill

2. Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author)

REFERENCE BOOKS:

1. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
2. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- NewDelhi, ISBN: 9780198089605, 0198089600 Edition: 2012.
3. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
4. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
5. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
6. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch,Jr., Amber R. Stiles, Robert Fesnak; Springer

COURSE OUTCOMES:

On Completion of the course, the students will be able to

1. Identify community issues through community Interaction
2. Illustrate the factors affecting social innovation in various sectors
3. Apply design thinking concept to analyze the community problems
4. Adopt the ethical values in implementing the Social innovation
5. Describe the process of property rights and patent filing.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						**1**	**2**		**3**	**2**		
CO2						**2**	**2**		**3**	**3**		
CO3				**2**		**2**	**3**		**2**	**3**		
CO4						**2**	**3**	**3**	**2**	**2**		
CO5		**2**		**2**		**2**	**3**		**2**	**3**		

(A400704) UNIVERSAL HUMAN VALUES
(Common to all branches)

B. Tech: I Semester

L	T	P	C
2	0	0	0

UNIT - I

Basic Guidelines, Content and Process for Value Education.

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking- disliking.

UNIT - II

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I am being the doer, seer and enjoyer) • Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT – III

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
- Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.

- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals • Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family.
- Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc., Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT - IV

Understanding Harmony in the Nature and Existence – Whole existence as Coexistence

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space.
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values.
- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.
- Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.

b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,

c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

- Case studies of typical holistic technologies, management models and production systems.
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.
- Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.

2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth".

COURSE OUTCOMES:

On completion of the course students will be able to

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature).
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability about various issues in life.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						**2**						
CO2			**2**						**2**			
CO3												
CO4								**2**				
CO5												**2**

****END****

(A400002) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All)

B.Tech: II Semester

L	T	P	C
3	1	0	4

UNIT-I

First Order Ode:

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II

Ordinary Differential Equations of Higher Order:

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type eax, sin$a$x, cosax, polynomials in x, $eax(x)$and $xV(x)$, method of variation of parameters.

UNIT-III

Laplace transforms:

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem and Second shifting theorem. Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't'. Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV

Vector Differentiation:

Vector point functions and scalar point functions, Gradient, Tangent plane and normal line, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions, Vector Identities.

UNIT-V

Vector Integration:

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXTBOOKS:

1. Higher Engineering Mathematics, (36thEdition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5thEdition), R.K. Jainand S.R.K. Iyengar, NarosaPublications,2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwinkreyszig, John Wiley& Sons,2006.
2. Calculus and Analytic geometry, (9thEdition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A textbook of Engineering Mathematics, (10thEdition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (9thEdition), H.K.Dassand Er.Rajnish Verma,S Chand and company Limited, New Delhi, 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	2
CO2	3	3	3	2	-	-	-	-	-	-	-	2
CO3	3	2	3	2	-	-	-	-	-	-	-	2
CO4	3	2	3	2	-	-	-	-	-	-	-	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3

END

(A400009) ENGINEERING CHEMISTRY
(Common to all Branches)

B. Tech: II Semester

L	T	P	C
3	1	0	4

UNIT-I:

Electrochemistry, Batteries and Corrosion Electrochemistry: Electrode potential, Standard electrode potential and E.M.F of the cell. Electrochemical cell, Nernst equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. Batteries- primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery) and Fuel cells (H2-O2 and methanol-oxygen), Solar cells - Introduction and applications of Solar cells. Corrosion: Introduction, Definition, Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning, Electroplating- Copper plating and electroless plating - Nickel plating.

UNIT-II:

Material Chemistry - High Polymers

Types of polymerizations (addition, condensation and copolymerization).

Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.

Fibers: Characteristics of fibers - preparation, properties and uses of Nylon-6,6 and Dacron, Fiber Reinforced Plastics (FRP) - applications.

Rubbers: Natural rubber and its vulcanization. Elastomers: Buna-s, Butyl rubber and Thiokol rubber. Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Preparation and applications of Polyvinyl acetate, Polylactic acid and poly vinyl alcohol.

UNIT-III:

Energy Sources

Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT-IV:

Water Technology

Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water Treatment- Specifications, Steps involved in Treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.

Industrial water treatment, Boiler Troubles-Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda Process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V:

Engineering Materials

Cement: Portland cement, its composition, setting and hardening.

Smart materials: Smart materials and their engineering applications.

Advanced Glass Technology: Structure and nature of glasses, transformation range behavior, dependence of physicochemical characteristic of glasses on their constituents. Strength of glass and glass articles.

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

Textbooks:

1. Engineering Chemistry (1st edition), Dr. K. Soujanya, Dr. J. Saroja, Lt. D. Divya, Skytech Publishers, 2022
2. Engineering Chemistry (1st edition), P. C. Jain and M. Jain, Dhanapat Rai& Sons.
3. Engineering chemistry (1st edition), Dr. Bharathikumari, Dr. Jyotsna.

Reference Books:

1. Engineering Chemistry (2nd edition), Shikha Agarwal; Cambridge University Press, 2015.
2. Engineering Chemistry (1st edition), Prasanth Rath, Cengage Learning, 2015.
3. Engineering Chemistry (3rd edition), B. Siva Shankar, Tata McGraw Hill Publishing Limited, 2015.
4. Text of Engineering Chemistry (12th edition), S. S. Dara, Mukkanti, S. Chand & Co, New Delhi, 2006.
5. Chemistry of Engineering Materials (5th edition), C. V. Agarwal, C. P. Murthy, A. Naidu, Wiley India, 2013.

COURSE OUTCOMES:

After completion of the course students will be able to

1. Apply the principles of electrochemistry, corrosion science and analyse application of battery technologies, fuel cells in practical applications.
2. Acquire knowledge on polymer technology and uses of key polymers in engineering fields.
3. Analyse various types of energy sources and understand the significance of alternative energy sources, including biodiesel and solar energy.
4. Investigate the impact of water hardness in industries, implement water purification technologies to ensure water quality for industrial and domestic use
5. Illustrate the composition, properties and application of engineering materials, including cement, smart materials, glass, and lubricants

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	2	-	-	-	-	-
CO2	3	-	2	-	2	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	3	-	-	-	-	2
CO4	3	-	-	3	-	2	2	-	-	-	-	-
CO5	3	-	2	-	2	-	2	-	-	-	-	-

****END****

(A405301) DATA STRUCTURES

(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech: II Semester

L	T	P	C
3	0	0	3

UNIT-I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array, and linked representations.

UNIT-II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching. Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT-III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT-IV

Graphs: Graph Implementation Methods. Graph Traversal Methods. Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT-V

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXTBOOKS:

1. Fundamentals of Data Structures in C, 2 Nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK

1. Data Structures: A Pseudocode Approach with C, 2 Nd Edition, R. F. Gisbergen B.A. Forouzan, Cengage Learning.

COURSE OUTCOMES

On completion of the course students will be able to

1. Design and Implement Linear Data structures.
2. Explain the need of Dictionary data structure and implement dictionary data structure using Hash tables and skip lists.
3. Design and implement various forms of tree data structures.
4. Explain, analyze, and implement various graph traversal, sorting techniques.
5. Describe various pattern matching algorithms.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**1**								**1**
CO2	**3**	**3**	**1**	**1**								**1**
CO3	**3**	**3**	**1**	**1**								**1**
CO4	**3**	**3**	**1**	**1**								**1**
CO5	**3**	**3**	**1**	**1**								**1**

****END****

(A402201) BASIC ELECTRICAL ENGINEERING
(Common to CSE, INF, ECE)

B. Tech: II Semester

L	T	P	C
2	0	0	2

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II:

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto transformer and three-phase transformer connections.

UNIT-IV:

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque- slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXTBOOKS:

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshi, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Surya Kalavathi, G.T. Chandrashekar, “Basic Electrical Engineering”, S. Chand, 2 Nd Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarti, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand and analyze basic concepts of DC Circuits.
2. Understand and analyze basic concepts of AC Circuits.
3. Discus the technical aspects of transformers.
4. Study the working principles of Electrical Machines.
5. Introduce components of Low Voltage Electrical Installations

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		1				2	3	2		1
CO2	3	3		1				2	3	2		1
CO3	3	3		1				2	3	2		1
CO4	3	3		1				2	3	2		1
CO5	3	3		1				2	3	2		1

****END****

(A403502) COMPUTER AIDED ENGINEERING DRAWING

B. Tech: II Semester

L	T	P	C
0	1	2	2

UNIT – I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and their Significance, Introduction to Computer aided drafting – views, commands.

Computer aided drafting of conic Sections: Ellipse, Parabola and Hyperbola – General Method (eccentricity) only. Computer aided drafting of Cycloid, Epicycloids and Hypocycloid.

UNIT- II:

Orthographic Projections: Introduction to Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Computer aided orthographic projections – points, lines, and planes.

UNIT – III:

Projections of Regular Solids: Introduction to Regular Solids – Prism, Cylinder, Pyramid, Cone Computer aided projections of solids – Regular views.

UNIT – IV:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines, Isometric Projection of Spherical Parts using computer aided drafting.

UNIT – V:

Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Conversion of orthographic projection into isometric view and vice versa using computer aided drafting.

TEXTBOOKS:

1. Engineering Drawing, 51st Edition, N.D. Bhatt, Charotar Pub, 2012.
2. Computer Aided Engineering Drawing, 2nd Edition, K. Balaveera Reddy et al, CBS Publishers, 2015.

REFERENCE BOOKS:

1. Engineering Drawing, 2nd Edition, Basant Agrawal and C M Agrawal, McGraw Hill, 2014.
2. Engineering Drawing, 1st Edition, M. B. Shah, B.C. Rane, Pearson, 2015.
3. Engineering Drawing, 1st Edition, N. S. Parthasarathy and Vela Murali, Oxford, 2015.

4. Engineering Drawing and graphics Using AutoCAD, 3rd Edition, T. Jeyapalan, Vikas, S. Chand and Company Ltd, 2000.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply computer aided drafting tools to create 2D objects like Conic section and Cycloidal curves.
2. Sketch the Orthographic projection of Point, Line and Plane objects by drafting tools.
3. Create, read and interpret engineering drawings of Solids by computer tools.
4. Create and interpret 2D and 3D Isometric objects by drafting tools.
5. Conversion of orthographic projection into isometric view and vice versa by using computer aided drafting tools.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3		3			2	3	3	1	2
CO2	3	1	3		3			2	3	3	1	2
CO3	3	1	3		3			2	3	3	1	2
CO4	3	1	3		3			2	3	3	1	2
CO5	3	1	3		3			2	3	3	1	2

****END****

(A400502) ENGINEERING CHEMISTRY LABORATORY

(Common to all Branches)

B. Tech: II Semester

L	T	P	C
0	0	2	1

Lab Experiments:

1.Estimation of Hardness of water by EDTA Method.
2.Estimation of Alkalinity of Water.
3.Estimation of Copper by Colorimetric Method.
4.Conductometric Titration of a Strong Acid vs a Strong Base.
5.Conductometric Titration of a Weak Acid vs a Strong Base.
6.Potentiometric Titration of a Strong Acid vs a Strong Base.
7.Potentiometric Titration of Ferrous Ammonium Sulphate (FAS) vs Potassium Dichromate.
8.Preparation of Thiokol Rubber.
9.Determination of Viscosity of a Liquid.
10.Determination of Surface Tension of a liquid.
11.Adsorption of acetic acid on Activated charcoal.
12.Estimation of Iodine in Table Salt (by potentiometric).
13.Thin Layer Chromatography (Ortho-Nitro phenol &Para-Nitro phenol).
14.Determination of rate constant of acid catalysed hydrolysis of methyl acetate.

Textbooks:

1. Engineering Chemistry Lab Manual (1st edition), Dr. K. Soujanya, Dr. J. Saroja, Lt. D. Divya, Skytech Publishers, 2022

Reference Books:

1.Engineering Chemistry Lab Manual (1st edition), Glaze Publishers 2018.
2.Engineering chemistry (1st edition), B. Rama Devi & Ch. Venkataramana Reddy; Cengage Learning, 2012.
3.A Textbook of Engineering Chemistry (1st edition), Sashi Chawla, Dhana path Rai& Sons.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine the extent of hardness of water and Assess the alkalinity and its consequences in industrial operations
2. Understand the principles, preparation and applications of key polymers like Thiokol rubber

3. Assess the properties of titrations involving acids, bases, redox reactions using potentiometric and conductometric analysis.
4. Develop proficiency in colorimetric analysis to accurately determine the amount of metals present in various industrial effluents
5. Apply analytical tools such as viscosity, and surface tension measurements to evaluate the physicochemical properties of liquid samples

C0-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	-	-	-	-	-	-	-	-
CO2	3	2	2	-	3	-	2	-	-	-	-	-
CO3	3	-	-	3	2	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	2	-	-	-	-	-
CO5	3	-	-	3	2	-	-	-	-	-	-	-

****END****

(A405505) DATA STRUCTURES LABORATORY

B. Tech: II Semester

L	T	P	C
0	0	3	1.5

List of Experiments

I. Linked List, Stacks, Queues.

Demonstration

1.Write a C program to implement Single linked list i) Insertion ii) Deletion iii) Display.
2.Write C programs to implement Stack ADT using Linked List.
3.Write C programs to implement Queue ADT using Linked List.
4.Write a function to reverse the nodes of a linked list.

Experiment

1.Write a program that uses functions to perform the following operations on doubly linked list: i) Creation ii) Insertion iii) Deletion iv) Traversal
2.Write a program that uses functions to perform the following operations on circular linked list: i) Creation ii) Insertion iii) Deletion iv) Traversal
4.Write a program that implement stack (its operations) using Arrays.
5.Write a program that implement Queue (its operations) using Arrays.

II. Dictionaries and Hashing Demonstration

1.Write a C program to implement different hash methods.
2.Write a C program to implement the following collision resolving.
i) Quadratic probing. ii) Linear Probing

Experiment

1.Implement Dictionary ADT using list data structure.
2.Implement Dictionary ADT using skip list data structure.

III. Search Trees Demonstration

1.Write a C program to implement Binary search tree.
i)Insertion ii) deletion iii) Traversals

Experimentation

1.Write a C program to implement binary search tree non-recursively traversals.
i)Pre- Order ii) Post –Order iii) In-Order
2.(A)Write a C Program to Check if a Given Binary Tree is an AVL Tree or Not.
(B)Write a C program to find height of a Binary tree.
(C)Write a C program to count the number of leaf nodes in a tree.

3.Write a C program to implement AVL tree.
i)Creation ii) Deletion iii) Traversals

IV. Graphs Demonstration

1.Write a C program for implementing Graph traversal.
i)DFS ii) BFS
2.Write C programs for implementing the following Sorting methods and display the important steps.
i)Quick Sort ii) Heap sort

Experimentation

3.Write C programs for implementing the following Sorting methods and display the important steps.
i)Merge sort ii) External Merge sort.

V. Pattern Matching Algorithms Demonstration

1.Write a C program for implementing pattern matching algorithms.
i)Knuth-Morris-Pratt ii) Brute Force

Experimentation

1.Write a C program for implementing pattern matching algorithms.
i.Brute force ii Boyer –Moore

TEXTBOOKS:

1.Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2.Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Design and Implement Linked List Data structure.
2. Design and Implement Linear Data structures.
3. Implement Sorting and Tree traversal techniques.
4. Design and Implement Non-Linear Data structures.
5. Implement KMP and Boyer-Moore pattern matching algorithms.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	3	-	-	-	-	-	-	1
CO2	3	3	1	1	3	-	-	-	-	-	-	1
CO3	3	3	1	1	3	-	-	-	-	-	-	1
CO4	3	3	1	1	3	-	-	-	-	-	-	1
CO5	3	3	1	1	3	-	-	-	-	-	-	1

****END****

(A402502) BASIC ELECTRICAL ENGINEERING LABORATORY

(Common to CSE, INF, ECE)

B. Tech: II Semester

L	T	P	C
0	0	2	1

List of experiments/demonstrations:

PART- A (compulsory)

1.Verification of KVL and KCL.
2.Verification of Thevenin's and Norton's theorem.
3.Transient Response of Series RL and RC circuits for DC excitation.
4.Resonance in series RLC circuit.
5.Calculations and Verification of Impedance and Current of RL, RC and RLC series Circuits.
6.Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer.
7.Performance Characteristics of a DC Shunt Motor.
8.Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1.Verification of Superposition theorem.
2.Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
3.Measurement of Active and Reactive Power in a balanced Three-phase circuit.
4.Magnetization Characteristics of DC Shunt Generator.

TEXTBOOKS:

1.D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2.MS Naidu and S Kamakshi, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P. Ramana, M. Surya Kalavati, G.T. Chandrashekar," Basic Electrical Engineering", S. Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. M. S. Sukhija, T. K. Nag sarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarti, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7.V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

COURSE OUTCOMES:
On completion of the course students will be able to

1.Verify the basic Electrical circuits through different experiments.
2.Analyze the transient responses of R, L and C circuits for different input conditions.
3.Calculate the Impedance and Current of RL, RC and RLC series Circuits.
4.Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
5.Measure the Active and Reactive Power in a single-phase transformer.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	0	1	0	0	0	2	3	2	2	1
CO2	3	3	0	1	0	0	0	2	3	2	2	1
CO3	3	3	0	1	0	0	0	2	3	2	2	1
CO4	3	3	0	1	0	0	0	2	3	2	2	1
CO5	3	3	0	1	0	0	0	2	3	2	2	1

****END****

(A400506) ENGINEERING EXPLORATION & PRACTICE

(Common to all branches)

B. Tech: II Semester

L	T	P	C
0	0	3	1.5

Week-1

Difference between Science and Engineering, Scientist and Engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer. Significance of teamwork, Importance of communication in engineering profession.

Week-2

Engineering Design Process, Need statement to Problem conversion, Pair wise comparison chart, decision matrix, Concepts of reverse engineering.

Week-3

Project management tools: Checklist, Timeline, Gantt chart, Requirement Analysis.

Week-4

Basic Components of a Mechanism, Degrees of Freedom, or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

Week-5

3-D Modelling of a Box with two holes and curvature.

Week-6

3-D Modelling of Electronic Enclosure and Assembly of two parts.

Week-7

Introduction to various platform-based development, Introduction to basic components, transducers, actuators and sensors, Introduction to Tinker cad.

Week-8

Introduction to Arduino, basics of programming.

Week-9

Interfacing Arduino with actuators and transducers.

Week-10

Interfacing Arduino with Sensors, Liquid Crystal Display (LCD).

Week-11

Assembly and Crafting the Prototype.

Week-12

Test and Validate the Prototype, Documentation, Panel Presentation.

TEXTBOOKS

1. Engineering Fundamentals: An Introduction to Engineering (Mind Tap Course List) 5th Edition by SaeedMoaveni
2. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author),Publisher: Notion Press.

REFERENCE BOOKS

1. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
2. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
3. Introduction to autocad®2017-2D and 3D design by Bernd S. Palm and Alf Yarwood, Routledge (Taylorand Francis group)
4. Software Project Management (SIE), (Fifth Edition); Bob Hughes, Mike Cotterell, Rajib Mall; Publishedby Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748

COURSE OUTCOMES

On completion of the course students will be able to

1. Explain the importance of engineering profession in the world.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Build a mechanism for a given application
4. Create basic 3D models and animations
5. Design a mechatronic system using Arduino and electronic components

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	3	3	2	-	3	-
CO2	-	3	1	3	2	-	-	-	3	-	3	-
CO3	3	-	2	-	3	-	-	-	3	-	3	-
CO4	2	3	2	-	3	-	-	-	3	2	3	-
CO5	-	-	2	1	2	-	3	-	3	-	3	-

****END****

(A400703) CONSTITUTION OF INDIA

(Common to all branches)

B. Tech: II Semester

L	T	P	C
2	0	0	0

UNIT - 1

History of Making of the Indian Constitution- History of Drafting Committee.

UNIT - 2

Philosophy of the Indian Constitution- Preamble Salient Features.

UNIT - 3

Contours of Constitutional Rights & Duties - Fundamental Rights.

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.
-

UNIT - 4

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT - 5

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Textbooks:

1. Introduction to the Constitution of India" by DD Basu

REFERENCE BOOKS

1.The Constitution of India, 1950 (Bare Act), Government Publication.
2.Dr. B. R. Ambedkar framing of Indian Constitution, Dr. S. N. Busi, 1st Edition, 2015.
3.Indian Constitution Law (7thEdn), M. P. Jain, Lexis Nexis, 2014.
4.Introduction to the Constitution of India, D.D. Basu, Lexis Nexis, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru.
4. Discuss the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
5. Discuss the passage of the Hindu Code Bill of 1956.

C0-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**-**	**-**	**-**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

****END****

(A405306) DISCRETE MATHEMATICS

B. Tech: III Semester

L	T	P	C
3	0	0	3

UNIT-I Mathematical logic:

Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II Set theory:

Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT-III Algebraic Structures:

Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT-IV Elementary Combinatorics:

Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT-V Graph Theory:

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four- Colour Problem.

TEXTBOOKS:

1.Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2.Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

1.Discrete and Combinatorial Mathematics - an applied introduction: Ralph. Grimald, Pearson education, 5th edition.
2.Discrete Mathematical Structures: Thomas Kosi, Tata McGraw Hill publishing co.

COURSE OUTCOMES:

1. Understand and construct precise mathematical proofs.

2. Apply logic and set theory to formulate precise statements.
3. Analyze and solve counting problems on finite and discrete structures.
4. Describe and manipulate sequences.
5. Apply graph theory in solving computing problems.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

****END****

(A404204) DIGITAL ELECTRONICS

B.Tech: III Semester

L	T	P	C
3	0	0	3

UNIT-I

BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic. Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT-II

GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive –Or function.

UNIT-III

COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT-IV

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters.

UNIT-V

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection, and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

TEXTBOOKS:

1.Digital Design–Third Edition, M. Morris Mano, Pearson Education/PHI.
2.Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA Mc Graw Hill Edition.
3.Fundamentals of Logic Design, Roth, 5th Edition, Thomson.

REFERENCEBOOKS:

1.Switching and Finite Automata Theory by Zvi Kohei, Tata Mc Graw Hill.
2.Switching and Logic Design, C.V.S. Rao, Pearson Education.
3.Digital Principles and Design– Donald D.Givone,Tata Mc Graw Hill, Edition.
4.Fundamentals of Digital Logic and Microcomputer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

COURSE OUTCOMES

On completion of the course students will be able to

1.Analyze various Boolean theorems and apply them to Boolean functions.
2.Apply Boolean algebra and K-Maps to minimize Boolean functions.
3.Design various combinational circuits.
4.Design different Sequential circuits.
5.Design digital systems using different PLDs.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

****END****

(A404203) ELECTRONIC DEVICES AND CIRCUITS

B.Tech: III Semester

L	T	P	C
2	0	0	2

UNIT-I

Diodes: Diode-Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch-switching times.

UNIT-II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT-III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times.

UNIT-IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT–V

Special Purpose Devices: Zener Diode-Characteristics, Zener diode as Voltage Regulator, Principle of Operation-SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXTBOOKS:

1.Jacob Millman-Electronic Devices and Circuits, McGraw Hill Education
2.Robert L.Boyle stead, Louis Nashelsky - Electronic Devices and Circuits theory, 11th Edition,2009, Pearson.

REFERENCEBOOKS:

1.Horowitz-Electronic Devices and Circuits, David A. Bell–5th Edition, Oxford.
2.Chinmoy Saha, Arindam Halder, Debaati Ganguly-Basic Electronics-Principles and Applications, Cambridge,2018.

COURSE OUTCOMES

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

1.Understand PN junction diode characteristics under various conditions.
2.Design different diode applications such as rectifiers, clippers& clampers.
3.Analyze the Bipolar Junction Transistor and its characteristics.
4.Understand the Field Effect Transistor characteristics and its applications.
5.Acquire knowledge about the role of special purpose devices and their applications.

C0-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

****END****

(A405304) DATABASE MANAGEMENT SYSTEMS

B. Tech: III Semester

L	T	P	C
3	0	0	3

Prerequisites: A course on "Data Structures".

UNIT – I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing (static and extensible hashing) Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXTBOOKS:

1.Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2.Database Management Systems, Raghuram Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS:

1.Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2.Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3.Introduction to Database Systems, C. J. Date, Pearson Education
4.Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5.Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6.Fundamentals of Database Management Systems, M. L. Gillen son, Wiley Student Edition.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Gain knowledge of fundamentals of DBMS, database design and normal forms.
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques.
5. Understand the concepts in file organization systems.

C0-PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**1**	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**1**	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**1**	**1**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

****END****

(A405303) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B. Tech: III Semester

L	T	P	C
3	0	0	3

UNIT - I

Object oriented thinking and Java Basics- Need for OOPs paradigm, summary of OOPs concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT - II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class.

Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages

Interfaces: Defining an interface, differences between classes and interfaces, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT - III

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT - IV

The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,

lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

UNIT - V

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Servlets, JDBC, Collection framework, JAVA8 features (Functional Programming and Lambda Functions).

TEXTBOOKS:

1.Java the complete reference, 7th edition, Herbert Scheldt, TMH.
2.Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCE BOOKS:

1.An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2.An Introduction to OOP, third edition, T. Budd, Pearson education.
3.Introduction to Java programming, Y. Daniel Liang, Pearson education.
4.An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.
5.Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
6.Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7.Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8.Java and Object Orientation, an introduction, John Hunt, second edition, Springer. 9. Maurach's Beginning Java2 JDK 5, SPD.

COURSE OUTCOMES

On completion of the course students will be able to

1. Demonstrate the behaviour of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
2. Demonstrate the implementation of inheritance (multilevel, hierarchical, and multiple) by using extend and implement keywords.
3. Use multithreading concepts to develop inter process communication.
4. Understand the process of graphical user interface design and implementation using AWT or swings.
5. Develop applets that interact abundantly with the client environment and deploy on the server.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**2**
CO2	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO3	**3**	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**1**	**1**	**3**	**1**	**3**	**-**	**-**	**-**	**1**	**-**	**1**	**1**
CO5	**3**	**1**	**3**	**-**	**3**	**-**	**-**	**-**	**1**	**-**	**1**	**1**

END

(A405508) DATABASE MANAGEMENT SYSTEMS LABORATORY

B. Tech: III Semester

L	T	P	C
0	0	3	1.5

Co-requisites: "Database Management Systems"

List of Experiments:

1. Concept design with E-R Model

Draw an ER diagram for the following.

b. There are two entity sets Employee and Department. These entity sets are participating in a relationship works in. The relationship set is converted into relation with attributes Emp No from Employee relation, Did from Department relation and since, the attribute of the relationship set itself.

2. Relational Model

a. Convert the above ER diagram into Relational Model

3.Normalization

Consider the following table.

a) Normalize the given Relation. Consider the given schema is in first normal form and

Eid	E.Name	Ph.no	Proj Id	Proj Name	Proj Leader	Emp City	City Zip
101	John	98765623, 998234123	P03	Project103	Grey	ModelTown	110033
102	John	890234677	P01	Project101	Christian	Badarpur	110044
103	Ryan	76213908	P04	Project104	Hudson	Naraina	110028
104	stephine	98132452	P02	Project102	Petro	HariNagar	110064

Schema (Student id, Student name, Project Id, Project name, City, country, ZIP) Primary key (Student id, Project id)
Fd's: Project Id → Project name
country→ ZIP, ZIP
b) Normalize the given Table to the BCNF Consider the set of Functional Dependencies.

Eid → E Name, Ph.no, Emp city, City Zip Primary Key = (EmpId, ProjId) ProjId → ProjName, ProjLeader
Emp Id, ProjId → Proj

Leader EmpCity → CityZip
ProjId → ProjLeader

4.Practicing DDL commands

5.Practicing DML commands

1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.
2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.
   b. Insert values into the table and use commit.
   c. Delete any three records in the department table and use rollback.
   d. Add constraint primary key and foreign key to the table
4. a. Create a user and grant all permissions to the user.
   b. Insert records in the sailor table and use commit.
   c. Add save point after insertion of records and verify save point.
   d. Add constraints not null and primary key to the sailor table.
5. a. Create a user and grant all permissions to the user.
   b. Use revoke command to remove user permissions.
   c. Change password of the user created.
   d. Add constraint foreign key and not null.
6. a. Create a user and grant all permissions to the user.
   b. Update the table reserves and use savepoint and rollback.
   c. Add constraint primary key, foreign key and not null to the reserves table.
   d. Delete constraint not null to the table column.

6.A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
6.B. Nested, Correlated subqueries

a. Find the Sid's of sailors who have reserved a red or a green boat.
b. Find the names of sailors who have reserved a red and a green boat.
c. Find the names of sailors who have reserved a red but not green boats.
d. Find all sids of sailors who have a rating of 10 or reserved boat 104.
e. Find the names of sailors who have reserved boat 103 using independent nested query.
f. Find the names of sailors who have reserved a red boat.
g. Find the names of sailors who have not reserved a red boat.
1.Find the names of sailors who have reserved boat number 103 using correlated nested query.
h. Find sailors whose rating is better than some sailor called 'Horatio'.
i. Find the sailors with the highest rating.
2.Find the names of sailors who have reserved both a red and a green boat using nested queries.

j. Find the names of sailors who have reserved all boats.

7.Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.

a. who is the youngest sailor.
b. Find the name of the sailor who have maximum rating.
c. What is the average rating of all Sailors.
d. how many sailors are there with the rating above 7.
e. The following SQL lists the number of customers in each country, sorted high to low.
f. The following SQL lists the number of customers in each country, sorted high to low (Only include countries with more than 5 customers):

8.Triggers (Creation of insert trigger, delete trigger, update trigger)

1.a. Create a pl/SQL trigger which will calculate the total marks and percentage of students after insert/update the details of a student in database.
b. Write a trigger that keeps backup of deleted records of emp trig table. Deleted records of emp_ trigger inserted in emp_ backup table.
2.Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.
Passenger (Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL);
a. Write a Insert Trigger to check the Passport_ id is exactly six digits or not.
b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when
insertion, deletion and updating are done on passenger respectively.

9.Procedures and functions

a. Create a procedure which displays employee salary for given employee number using out variable.
b. Write a pl/SQL block which displays the department name for department 40.
c. Create a procedure to check whether the given number is prime or not.
d. Create a function which returns weekday of a given date.
e. Create a function which returns number of sailors for a given rating level.
f. Create a procedure to find the lucky number of a given birth date.
g. Create a function which returns average age of sailors for a given rating level.

10.Usage of Cursors

a. Display the employee names and their salary for the accepted department number.
b. Display the top N earners for an accepted department number.

c. To write a Cursor to display the list of employees who are working as a managers or Analyst.

d. Write a Cursor to find employee with given job and dept no.

e. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated, we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee 'table.

11.Packages

a. creates HR package which contains Hire and Fire functions.

Hire function adds the details of employee and Fire function deletes the details of Employee.

TEXTBOOKS:

1.Database Management Systems, Raghuram Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition.

2.Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:

1.Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2.Fundamentals of Database Systems, Elmasri Navrate, Pearson Education

3.Introduction to Database Systems, C.J. Date, Pearson Education

4.Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.

5.Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.

6.Fundamentals of Database Management Systems, M. L. Gillen son, Wiley Student Edition.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Design database schema for a given application and apply normalization.
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers.
4. Learn to write Functions and packages.
5. Performing subqueries and nested queries.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO2	**1**	**1**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO3	**1**	**1**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO4	**1**	**1**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	**1**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

****END****

(A405507) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

B. Tech: III semester

L	T	P	C
0	0	3	1.5

Note:

1.Use LINUX and My SQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.
2.The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Experiments:

1.Use Eclipse or Net bean platform and acquaint yourself with the arouses. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a smallprogramofabout10to15lineswhich contains at least one if else condition and a for loop.

2.Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

3.Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method prints Area () that prints the area of the given shape.

4.Write a Java program that correctly implements the producer – consumer problem using the concept to inter thread communication.

5.Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

6.A) Develop an applet in Java that displays a simple message.
B) Develop an applet in Java that receives an integer in one text field and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

7.Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the

program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

8.Suppose that a table named Table. Txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.
Write a java program to display the table using Labels in Grid Layout.

9.Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

10.Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record is separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

11.Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

12.Write a Java program to list all the files in a directory including the files present in all its sub directories.

Textbooks:

1.Java the complete reference, 7th edition, Herbert Scheldt, TMH.
2.Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCEBOOKS:

1.Java for Programmers, P.J.Deitel and H.M.Deitel,10thEditionPearsoneducation.
2.Thinking in Java, Bruce Eckel, Pearson Education.
3.Java Programming, D. S. Malik and P.S. Nair, Cengage Learning.
4.Core Java, Volume1,9thedition, CayS. Horstmann and GCornell, Pearson.

COURSE OUTCOMES

1. Able to write programs for solving real world problems using the java collection framework.
2. Able to write programs using abstract classes.
3. Able to write multi-threaded programs.
4. Able to write GUI programs using swing controls in Java.
5.Able to create a file directories and sub directories.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	3	-	-	-	-	-	-	3
CO2	3	1	3	1	2	-	-	-	-	-	1	2
CO3	2	1	3	2	-	-	-	-	-	-	-	-
CO4	3	1	3	1	2	-	-	-	1	-	1	1
CO5	3	1	3	-	2	-	-	-	1	1	1	1

****END****

(A405506) PYTHON PROGRAMMING LABORATORY

B. Tech: III semester

L	T	P	C
0	1	2	2

Week 1.

(Python Language Fundamentals-Installation -Identifiers, Reserved Words, Data Types, Type Casting, Immutability)

Demonstration

Experiment-1: Install Anaconda open-source framework for python.
Experiment-2: Write a program to display 'Hello World'.
Experimentation

Experiment-3: Explore various IDEs for python program development.

Experiment-4: The volume of a sphere with radius r is 4/3 πr3. Write a Python program to find the volume of a sphere with radius 5?
Week 2.

(Arithmetic Operators, Relational Operators, Logical operators, Bitwise operators, Assignment operators, Special operators)

Demonstration

Experiment-1; Write a python program to find minimum and maximum of given three numbers.

Experiment-2: Suppose the cover price of a book is $24.95, but bookstores get a 40% discount. Shipping costs $3 for the first copy and 75 cents for each additional copy. Write a python program to compute. the total wholesale cost for 60 copies?
Experimentation

Experiment-3: Write a Python Program to Find the Square Root of a number without using sqrt function.

Experiment-4: Python Program to Convert Celsius to Fahrenheit.

Experiment-5: Python program to find the maximum of two numbers using ternary operator.
Week 3.

(Mathematical Functions, Input and Output statements, Command Line Arguments, String Functions)

Demonstration

Experiment-1: Write a Python program to find area of circle.

Experiment-2: Write a program to read Employee data from the keyboard and print that data.
Experimentation

Experiment-3: Write a program to read 3 float numbers from the keyboard with comma separator and print their sum.
Experiment-4: Write a Program to display Command Line Arguments.

Week 4.

(Flow Control Statements-Conditional Statements, Transfer Statements, Iterative Statements)

Demonstration

Experiment-1. Write a Python program to take a single digit number from the keyboard and print is value in English word?
Experiment-2. Write a Python Program to check whether an n-digit integer is an Armstrong number or not.
Experimentation

Experiment-3. Write a Python program to display *'s in pyramid style (also known as equivalent triangle).
Experiment-4. Write a Python Program to Display the multiplication Table.

Week 5.

(Functions-Built in functions, user defined functions, Parameters, return statement, returning multiple values from function, type of arguments, Types of variables-global, local. Recursive functions, Lambda functions, filter function, reduce function, Function aliasing, Function decorators, Generators)

Demonstration

Experiment-1: Write a python function to find factorial of given number?
Experiment-2: Write a program to create a lambda function to find square of given number?
Experimentation
Experiment-3: Lambda Function to find biggest of given values.
Experiment-4: Program to filter only even numbers from the list by using filter () function?

Week 6.

(Working with Strings-Defining String, Multi-line Strings, accessing characters of a string, Mathematical operators for strings, Membership operator, Comparison of Strings, removing spaces from the string, Finding Substring, String replacement, Splitting of Strings, changing cases of a string, Formatting the strings)

Demonstration

Experiment-1: Write a program to accept some string from the keyboard and display its characters by index wise (both positive and negative index).

Experiment-2: Write a program to access each character of string in forward and backward direction by using while loop?

Experimentation

Experiment-3: Program to display all positions of substring in a given main string. **Experiment-4**: Write a program to reverse the given String.

Week 7.

(Python Data Structures-List: Creating a list- Accessing elements of a List, Traversing the List, List Manipulation, Ordering the elements of a List, Mathematical Operators for List objects, Membership Operator, Nested Lists, List Comprehensions)

Demonstration

Experiment-1: Write a Python program to display unique vowels present in the given word.
Experiment-2: Write a Python program to Count the Occurrence of an Item in a List.
Experimentation
Experiment-3: Write a Python program to segregate even and odd numbers from the given list of numbers.
Experimnet-4: Write a Python program to find the cumulative sum of elements of the list.

Week 8.

(Python Data Structures-Tuple: Creating a Tuple, Accessing the elements of a tuple, mathematical operators for tuple, Tuple packing and Unpacking)

Demonstration

Experiment-1: Python program for adding a Tuple to List and Vice-Versa.
Experiment-2: Write a Python program to perform the summation of all elements of each tuple from the list of tuples.
Experimentation

Experiment-3: Write a Python program to multiply adjacent elements of a tuple.
Experiment-4: Write a Python program to find the maximum element in the tuple list.

Week 9.

(Python Data Structures-Set: Creating a Set object, functions of set, Mathematical operations on set, Membership Operators, Set Comprehension, Python Data Structures-Dictionary: Creating a Dictionary Object, accessing data from the dictionary, updating dictionaries, Deleting from dictionary, Functions on dictionary, dictionary comprehension).

Demonstration

Experiment-1: Write a Python program to perform set operations.
Experiment-2: Write a program to print different vowels present in the given word?
Experiment-3: Write a Python program to generate powers of 2 using set comprehensions.
Experiment-4: Write a program to eliminate duplicates present in the list using set
Experiment-5: Write a Python program to enter name and percentage marks in a dictionary and display information on the console.

Experimentation

Experiment-6: Write a program to take dictionary from the keyboard and print the sum of values?
Experiment-7: Write a program to find number of occurrences of each letter present in the given string using dictionary. Experiment-8: Write a program to accept student name and marks from the keyboard and creates a dictionary. Also display student marks by taking student name as input.

Week 10.

(Python Modules-Creating Modules, accessing members, module aliasing, member aliasing, reloading a module, The special variable: name. Working with Math, random modules, Python Packages. Python-File Handling-Types of Files, Opening a file, closing a file, properties of File object, writing data to text file, Reading character data from text files, seek (), tell () functions.)

Demonstration

Experiment-1: Create a module fibo.py containing Fibonacci(n) function(s) and import fibo module in a python script to print Fibonacci series upto n.
Experiment-2: Write a python program to print all the contents of a given module.
Experiment-3: Write a python program to create a package containing two or modules.
Experiment-4: Write a python program to import module from a package created in Experiment-3.

Experimentation

Experiment-5: Write a program to check whether the given file exists or not. If it is available, then print its content?
Experiment-6: Write a python Program to print the number of lines, words and characters present in the given file?
Experiment-7: Program to read image file and write to a new image file?
Experiment-8: Write a python program to read and write to a CSV file.

Note:

Experiments under Demonstration section is to be demonstrated by the concerned faculty and the experimentts under Experimentation section must be performed by the students individually.

Textbooks:

1. Learning Python, Mark Lutz, Orielly, 3 Edition 2007.

2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017

REFERENCE BOOKS:

1.Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2.Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
3.Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
4.R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019.

Web links:

1.https://docs.python.org/3/tutorial/modules.html#packages
2.https://www.includehelp.com/python/programs.aspx.
3.https://www.anaconda.com/products/individual
4.https://www.jetbrains.com/pycharm/

COURSE OUTCOMES

On completion of the course students will be able to

1. Design solutions to computational problems using Python programming language constructs.
2. Write python programs to manipulate string objects.
3. Use appropriate Data structures to organize and manipulate data items.
4. Design modular application using python module & package concepts.
5. Develop application to read and write from various file formats.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	2	2	-	-	-	-	-	-	1
CO2	2	2	3	1	3	-	-	-	-	-	-	1
CO3	3	2	2	1	3	-	-	-	-	-	-	1
CO4	1	3	2	2	3	-	-	-	-	-	-	1
CO5	-	2	1	1	3	-	-	-	-	-	-	1

****END****

(A400507) SKILL DEVELOPMENT COURSE

(DATA VISUALIZATION - R PROGRAMMING/ POWER BI)

B.Tech: III Semester

L	T	P	C
0	0	2	1

1. Understanding Data, what is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?
2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel.
3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

Textbooks:

1. Introducing Microsoft Power BI, Alberto Ferrari and Marco Russo

2. Hands on Programming With R: Write Your Own Functions and Simulations

REFERENCE BOOKS:

1.Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2.R Programming for Data Science by Roger D. Peng (References)
3.The Art of R Programming by Norman Matloff Cengage Learning India.

COURSE OUTCOMES:

At the end of the course a student should be able to

1.Understand How to import data into Tableau.
2.Understand Tableau concepts of Dimensions and Measures.

3.Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4.Create a Dashboard that links multiple visualizations.
5.Use graphical user interfaces to create Frames for providing solutions to real world problems.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**3**	**-**	**3**
CO2	**1**	**1**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**3**	**-**	**2**
CO3	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**3**	**-**	**2**
CO4	**1**	**1**	**2**	**1**	**3**	**-**	**-**	**-**	**1**	**3**	**-**	**2**
CO5	**1**	**1**	**2**	**-**	**3**	**-**	**-**	**-**	**1**	**3**	**-**	**2**

****END****

(A400507) SOCIAL INNOVATION IN PRACTICE

(Common for all branches)

B.Tech:III Semester

L	T	P	C
0	0	2	1

Week-1

Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis.

Week-2

Generating effective System Requirement document

Week-3

Social Innovation – Case Studies

Week-4

Impact of Social Innovation on communities

Week-5

Process of Social Innovation Prompts – identifying needs, Proposals –generating ideas, Prototyping – testing the idea in practice,

Week-6

Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change

Week-7

Introduction to sustainability, Sustainability leadership, Life cycle assessment

Week-8

Carbon footprint Calculation

Week-9

Types of Start-Ups, Types of business models, Market risks and Marketing strategies

Week-10

Verification of Business Model and Validation

Week-11

Business Model Development

Week-12

Documentation and Panel presentation

TEXT BOOKS:

1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, Yeheskel Hasenfeld; PalgraveMacmillan

REFERENCE BOOKS:

1. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean
2. Introduction to Sustainability by Robert Brinkmann, Wiley-Blackwell

COURSE OUTCOMES:

On Completion of the course, the students will be able to

1. Identify several social issues to be addressed
2. Analyze the impact of social innovations on the society
3. Illustrate the process of social innovation for a community problem
4. Demonstrate the solution from sustainability perspectives.
5. Develop a scalable business model

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			**2**				**3**					**1**
CO2			**2**				**3**					**1**
CO3			**2**				**3**					**1**
CO4			**2**				**3**					**1**
CO5			**2**				**3**					**1**

****END****

(A400701) ENVIRONMENTAL SCIENCES (MANDATORY COURSE)

B.Tech: III Semester

L	T	P	C
2	0	0	0

UNIT-I

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geochemical cycle, Classification of Ecosystem.

UNIT-II

Natural Resources, Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation. Mining and dams – their effects on forest and tribal people, Water resources, Use and over-utilization of surface and ground water, Floods, droughts, Water logging and salinity, Dams–benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Biodiversity and its conservation, Value of bio-diversity-consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot- spots, habitat loss, poaching of wildlife, loss of species, seeds, etc. Conservation of bio-diversity–Insite and Ex- sit conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. Environmental case studies.

UNIT-V

Environmental Problems in India, drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams –resettlement and rehabilitation of people: problems and concerns, Rainwater harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable lifestyles, Environmental Impact Assessment.

TEXTBOOKS:

1. Environmental Science (1st edition), Y. Anjaneyulu, B S Publications.
2. Environmental studies (1st edition), Deekshadave, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:

1. Environmental sciences and Engineering (1st edition), P. Venugopal Rao, PHI learning Pvt. Ltd.,
2. Environmental Science and Technology (1st edition), M. Anji Reddy, B S Publications.
3. Environmental Encyclopedia (Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.

COURSEOUTCOMES:

1. Understand the basic concepts, scope, and importance of environmental studies
2. Acquire knowledge on natural resources and analyze the impacts of modern agriculture
3. Evaluate the value, threats, and conservation methods of biodiversity, understand India's as a mega diversity habitat.
4. Analyze global environmental pollution issues and understand the hazardous effects of environmental pollution
5. Examine environmental problems in India, and understand various environmental issues to focus on sustainable practices for Environmental Impact Assessment

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	2	3	1	-	1	-	2
CO2	3	3	2	2	-	2	3	1	-	-	-	2
CO3	2	2	3	1	-	2	3	1	-	-	-	2
CO4	2	3	2	2	-	2	3	1	-	-	-	2
CO5	2	2	3	3	-	3	3	1	-	-	-	2

****END****

(A400006) COMPUTER ORIENTED STATISTICAL METHODS

B. Tech: IV Semester

L	T	P	C
3	1	0	4

UNIT-I

Probability:
Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's Rule.
Random Variables: Concept of a Random Variable, Discrete and Continuous random Variable.

UNIT-II
Expectation and Discrete Distributions:
Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.
Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III
Continuous Distributions and Sampling Distributions:
Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, **Sampling Distributions**: Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F-Distribution.

UNIT-IV
Sample Estimation & Tests of Hypotheses:
Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two sample: Estimating the difference between two means, Single sample: Estimating a proportion, two samples: Estimating the difference between two proportions, two samples: Estimating the ratio of two variances.
Statistical Hypotheses: General Concepts, testing a Statistical Hypothesis, Single sample: Tests concerning single mean, Two samples: tests on two means, One sample: test on single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V
Stochastic Processes and Markov Chains:
Introduction to Stochastic processes: Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXTBOOKS:

1. 1.Probability & Statistics for Engineers & Scientists, (9thEdition), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 2011.
2. Fundamentals of Mathematical statistics, SC Gupta and V K Kapoor, Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics for Engineers, T. T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, Academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Millerand Freund's, Pearson Educations, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply the concepts of probability and Random variables case studies.
2. Formulate and solve problems involving random variables and discrete distributions.
3. Apply sampling techniques for analyzing experimental data.
4. Apply concept of estimation and testing of hypothesis to case studies.
5. Analyze the data using the Stochastic process and Markov chains.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	-	2	-	-	-	-	2
CO2	3	3	2	2	2	-	2	-	-	-	-	2
CO3	3	3	2	2	2	-	-	-	-	-	-	2
CO4	3	3	2	3	2	-	2	-	-	-	-	2
CO5	3	3	2	3	2	-	-	-	-	-	-	2

****END****

(A405305) OPERATING SYSTEMS

B. Tech: IV Semester

L	T	P	C
3	0	0	3

Prerequisites:

1.A course on "Computer Programming and Data Structures".
2.A course on "Computer Organization and Architecture".

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, wait pid, exec.
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, l seek, stat, ioctl system calls. Disk Scheduling Algorithms

TEXTBOOKS:

1. Operating System Principles- Abraham Silber chatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Will be able to control access to a computer and the files that may be shared.
2. Demonstrate the knowledge of the components of computers and their respective roles in computing.
3. Ability to recognize and resolve user problems with standard operating environments.
4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.
5. Understand the file system concepts and allocation methods

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	**1**	**1**	**2**									**2**
CO2	**1**	**1**	**2**									**2**
CO3	**1**	**1**	**2**		**2**							**2**
CO4	**1**	**1**	**2**		**2**				**1**			**2**
CO5	**1**	**1**	**2**		**2**				**1**			**2**

****END****

(A405307) COMPUTER ORGANIZATION AND ARCHITECTURE

B. Tech: IV Semester

Co-requisite: A Course on "Digital Electronics".

L	T	P	C
3	0	0	3

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

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

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT – II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit. Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, Booth's multiplication Algorithms, Restoring and Non-Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Cache Coherence.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, inter processor arbitration, Inter processor communication and synchronization, Cache Coherence. Introduction to 8085 Architecture

TEXTBOOK:

1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, V th Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4 th Edition, PHI/Pearson.

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the basics of instruction sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	1	1	2									
CO2	1	1	2	1								
CO3	1	2	2	2								
CO4	1	2	2	1								
CO5	1	1	2									

****END****

(A462301) COMPUTER NETWORKS

B. Tech: IV Semester

L	T	P	C
3	0	0	3

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless Transmission.

Data link layer: Design issues, framing, Error detection and correction.

UNIT – II

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, Network layer on the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXTBOOKS:

1. Andrew S Tanenbaum, David.J. Wetherall, Computer Networks, 5th Edition. Pearson Education/PHI.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

COURSE OUTCOMES

On completion of the course students will be able to

1. To Gain the knowledge of the basic computer network technology.
2. To Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. To Obtain the skills of subnetting and routing mechanisms.
4. To Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.
5. Understand the protocols like (HTTP, SMTP, etc..)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**1**	**2**									
CO2	**1**	**1**	**2**	**1**								
CO3	**1**	**2**	**2**	**2**								
CO4	**1**	**2**	**2**	**1**								
CO5	**1**	**1**	**2**									

****END****

(A462302) CYBER SECURITY ESSENTIALS

B.Tech : IV Semester

L	T	P	C
3	0	0	3

UNIT- I

Cyber Security Fundamentals: Network and Security Concepts- Information Assurance Fundamentals, Basic Cryptography, Symmetric Encryption, Public Key Encryption, The Domain Name System (DNS), Firewalls, Virtualization, Radio-Frequency Identification **Microsoft Windows Security Principles:** Windows Tokens, Window Messaging, Windows Program, The Windows firewalls.

UNIT- II

Attacker Techniques and Motivations: How Hackers Cover Their Tracks (Antiforensics) How and Why Attackers Use Proxies, Tunneling Techniques, Fraud Techniques, Threat Infrastructure.

UNIT- III

Exploitation: Techniques to Gain a Foothold, Misdirection- Shellcode, Integer Overflow Vulnerabilities, Stack-Based Buffer Overflows, Format String Vulnerabilities, SQL Injection, Malicious PDF Files, Race Conditions, Web Exploit Tools, DoS Conditions, Brute Force and Dictionary Attacks, Reconnaissance, and Disruption Methods- Cross-Site Scripting (XSS), Social Engineering, WarXing, DNS Amplification Attacks.

UNIT- IV

Malicious Code: Self-Replicating Malicious Code- Worms, Viruses. Evading Detection and Elevating Privileges- Obfuscation, Virtual Machine Obfuscation, Persistent Software Techniques, Rootkits, Spyware, Attacks against Privileged User Accounts and Escalation of Privileges, Token Kidnapping, Virtual Machine Detection. Stealing Information and Exploitation- Form Grabbing, Man-in-the-Middle Attacks, DLL Injection, Browser Helper Objects.

UNIT- V

Defense and Analysis Techniques: Memory Forensics, Honeypots, Malicious Code Naming, Automated Malicious Code Analysis Systems, Intrusion Detection Systems.

TEXTBOOK:

1. James Graham, Richard Howard, Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor & Francis Group, 2011.

REFERENCE BOOKS:

1. Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental of Cyber Security (Principles, Theory and Practices) BPB Publications 2018.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand basic cryptographic techniques for securing information and analyze cyber threats using concepts such as proxies, tunneling, and fraud techniques.
2. Develop skills in identifying and exploiting vulnerabilities, including shellcode, buffer overflows, SQL injection, and web exploit tools.
3. Demonstrate knowledge of malicious code, its types (worms, viruses), and countermeasures against evasion, privilege escalation, and information theft.
4. Analyze defense and analysis techniques, including memory forensics, honeypots, and intrusion detection systems, for proactive cybersecurity measures.
5. Understand the defense techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**1**	**2**									
CO2	**1**	**1**	**2**	**1**								
CO3	**1**	**2**	**2**	**2**								
CO4	**1**	**2**	**2**	**1**								
CO5	**1**	**1**	**2**									

CO-PO MAPPING

****END****

(A405509) OPERATING SYSTEMS LABORATORY

B. Tech: IV Semester

L	T	P	C
0	0	2	1

Prerequisites:

1.A course on "Programming for Problem Solving",
Co-requisite: A course on "Operating Systems".

List of Experiments:

1.A) Demonstrate the Installation & Configuration of Linux Operating Systems.
B) Explore the following Linux File System commands.
i) pwd ii) cd iii) mkdir iv) rmdir v) ls vi) cp vii) mv viii) rm ix) cat x) more xi) grep

2.Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir).

3.Write C programs to simulate the following CPU Scheduling algorithms.
a)FCFS b) SJF c) Round Robin d) priority

4.Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

5.Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

6.Write C programs to illustrate the following IPC mechanisms.
a)Pipes b) FIFOs c) Message Queues d) Shared Memory

7.Write C programs to simulate the following memory management techniques.
a)Paging b) Segmentation
7.Write a C program to simulate the following contiguous memory allocation techniques.
a). First-fit b) Best-fit c) Worst-fit

8.Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal.
9.Simulate the following File Allocation Strategies
a). Sequential b). Indexed c. Linked
10.Write a shell script that receives any number of file names as arguments checks if every argument. supplied is a file or directory and reports accordingly. Whenever the arguments is a file it reports number of lines present in it.
11.Simulate the following disk scheduling algorithms.
a). SCAN b). CSCAN c). SSTF

TEXTBOOKS:

1.Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2.Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1.Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2.Operating System - A Design Approach-Crowley, TMH.
3.Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4.UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5.UNIX Internals: The New Frontiers, U. Vahala, Pearson Education.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Demonstrate and implement C programs using Unix/Linux system calls.
2. Simulate and implement operating system concepts such as scheduling and deadlock management.
3. Simulate and implement Inter process Communication Mechanisms.
4. Simulate and implement memory management techniques.
5. Simulate and implement File Management and Disk Scheduling Algorithms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1		2	2		2							
CO2		2	2	2	2							
CO3		2	2	2	2							
CO4		2	2	2	2							
CO5		2	2	2	2							

CO-PO MAPPING:

****END****

(A462501) COMPUTER NETWORKS LABORATORY

B.Tech : IV Semester

L	T	P	C
0	0	2	1

List of Experiments

1.Implement the data link layer framing methods such as character, character-stuffing, and bit stuffing.

2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP

3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.

4. Implement Dijkstra's algorithm to compute the shortest path through a network.

5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.

6. Implement distance vector routing algorithm for obtaining routing tables at each node.

7. Implement data encryption and data decryption.

8. Write a program for congestion control using Leaky bucket algorithm.

9. Write a program for frame sorting techniques used in buffers.

10.Wireshark

i.Packet Capture Using Wire shark.
ii.Starting Wire shark
iii.Viewing Captured Traffic
iv.Analysis and Statistics & Filters.
How to run Nmap scan Operating System Detection using Nmap

Do the following using NS2 Simulator

i.NS2 Simulator-Introduction
ii. Simulate to Find the Number of Packets Dropped
iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
iv. Simulate to Find the Number of Packets Dropped due to Congestion.
v. Simulate to Compare Data Rate & Throughput.
vi. Simulate to Plot Congestion for Different Source/Destination
vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXTBOOKS:

1. Andrew S Tanenbaum, David.J. Wetherall, Computer Networks, 5th Edition. Pearson Education/PHI.

COURSE OUTCOMES

On completion of the course students will be able to

1. Implement data link layer farming methods.
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer.
5. To be able to work with different network tools.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1		**2**	**2**		**2**							
CO2		**2**	**2**	**2**	**2**							
CO3		**2**	**2**	**2**	**2**							
CO4		**2**	**2**	**2**	**2**							
CO5		**2**	**2**	**2**	**2**							

****END****

(A400702) GENDER SENSITIZATION

B.Tech : IV Semester

L	T	P	C
0	0	2	0

UNIT-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender- Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood-Growing up Male, First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio-Demographic Consequences-Gender Spectrum: Beyond the Binary.

UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. –Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

UNIT – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective- Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? –When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature Gender Development Issues-Gender Issues -Gender Sensitive Language-Gender and Popular Literature – Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters-Mothers and Fathers- Rosa Parks the Brave Heart.

Textbooks:

3. Towards a world of equals (a bilingual textbook on gender)

REFERENCE BOOKS

1.Towards a World of Equals: A Bilingual Textbook on Gender, A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. (This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film).
3. Students will attain a finer grasp of how gender discrimination works in our society and acquire insight into the gendered division of labour and its relation to politics and economics.
4. Men and women students and professionals will be better equipped to work and live together as equals.
5. Students will develop a sense of appreciation of women in all walks of life by going through accounts of studies and movements as well as the new laws that provide protection and relief to women.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-
CO5	-	-	3	-	-	--	-	-	-	-	-	-

CO-PO MAPPING:

****END****

(A462303) NETWORK SECURITY AND CRYPTOGRAPHY

B.Tech : V Semester

L	T	P	C
3	1	0	4

UNIT - I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security. Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH). Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, Combining security associations, Internet Key Exchange. Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXTBOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition.
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition.

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues
2. Students will be able to understand symmetric asymmetric key ciphers
3. Students will be able to understand messages and web authentication and security issues.
4. Ability to identify information system requirements for both client and server.
5. Ability to understand the current legal issues regarding information security.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	2	1									1
CO2	3	2	1									1
CO3	3	2	1									1
CO4	3	2	1					1				1
CO5	3	2	1					1				1

****END****

(A462304) ALGORITHM DESIGN AND ANALYSIS

B. Tech: V Semester

L	T	P	C
3	0	0	3

UNIT-I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT – II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps,

Heapsort Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph Coloring, Hamiltonian cycles.

UNIT – III

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT – IV

Greedy method: General method, applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components.

UNIT – V

Branch and Bound: General method, applications - Travelling salesperson problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

TEXTBOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, Second Edition, T.H. Cormen C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt .Ltd / Pearson Education.

3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia John Wiley and sons.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain various asymptotic notations to measures the performance of an algorithm.
2. Discuss various algorithm design strategies.
3. Apply Graph & tree algorithms for real world applications.
4. Describe various computability classes.
5. Illustrate p and NP-Type problems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**		**1**							**1**
CO2	**3**	**3**	**1**		**1**							**1**
CO3	**2**	**3**	**3**		**1**							**1**
CO4	**1**	**3**	**3**		**1**							**1**
CO5	**1**	**3**	**2**		**1**							**1**

****END****

(A462305) CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS

B.Tech: V Semester

L	T	P	C
3	0	0	3

UNIT – I

Foundations of Digital Forensics: Digital Evidence, Principles of Digital Forensics, Challenging aspects of Digital Evidence, The Role of computers in crime, Cyber Crime Law.

UNIT – II

Digital Investigations: Digital Investigation process models, Applying Scientific method in Digital Investigations, handling a digital Crime scene: Fundamental Principles, Surveying and Preserving Digital Investigation.

UNIT – III

Violent Crime and Digital Investigation: The role of Computers in violent crime, Processing Digital crime scene, Investigative Reconstruction, Digital Evidence as Alibi.

UNIT - IV

Cyber stalking, Computer basics for Digital Forensics, Applying Forensics science to computers, Digital Evidence on windows systems, Digital Evidence on Unix systems.

UNIT - V

Network Forensics: Networks basics for Digital Investigators, Applying Forensics science to networks, Digital Evidence on physical and data link layers, Digital Evidence on Network and Transport layers.

TEXTBOOK:

1. Digital Evidence and computer Crime by Eoghan Casey Academic Press Third Edition.

REFERENCE BOOKS:

1. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.
2. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics J.Sammons, Syngress Publishing, 2012.
3. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

1. To obtain and analyze digital information for possible use as evidence in civil, criminal or administrative cases.
2. To learn about the importance of digital forensic principles and procedures
3. To know legal considerations and digital evidence controls
4. To learn about digital forensic tools.
5. To learn about writing a forensic report.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**									**1**
CO2	**3**	**2**	**1**		**1**							**1**
CO3	**3**	**2**	**1**		**1**							**1**
CO4	**3**	**2**	**1**		**1**							**1**
CO5	**3**	**2**	**1**		**1**							**1**

****END****

(A462306) FORMAL LANGUAGES AND AUTOMATA THEORY

B.Tech : V Semester

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory –Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions. Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Mealy machines

UNIT – II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma. Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT – III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Applications of Context- Free Grammars, Ambiguity in Grammars and

Languages. Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Greibach Normal form. Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's Turing Machines: Introduction to Turing Machine, Formal Description, instantaneous description, The language of a Turing machine.

UNIT - V

Types of Turing machine: Turing machines and halting Undecidability: Undecidability, A Language that is Not Recursively numerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's

Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXTBOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrasekharan, 2nd edition, PHI.

REFERENCE BOOKS:

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Textbook on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the concept of abstract machines and their power to recognize languages.
2. Employ finite state machines for modelling and solving computing problems.
3. Design context free grammar for formal languages.
4. Understanding the Chomsky hierarchy.
5. Distinguish between decidability and undecidability.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									1
CO2	3	3	3									1
CO3	2	3	3									1
CO4	1	3	3									1
CO5	2	3	2									1

****END****

(A462502) NETWORK SECURITY AND CRYPTOGRAPHY LAB

B.Tech : V Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Write a program to implement the DES algorithm logic.
2. Write a program to implement the AES algorithm logic.
3. Implement RSA encryption to demonstrate the concept of public and private key.
4. Write a program to implement the Blowfish algorithm logic.
5. Demonstrate DNS spoofing and DNS cache positioning attacks.
6. Set up and configure a basic firewall tool like iptables.
7. Write a program to implement the Rijndael algorithm logic.
8. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish.
9. Create your own key using Java key tool.
10. Write a program to implement the RSA algorithm.
11. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
12. Calculate the message digest of a text using the SHA-1 algorithm.
13. Calculate the message digest of a text using the MD5 algorithm.

TEXTBOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand basic cryptographic algorithms, message and web authentication and security issues.
2. Identify information system requirements for both of them such as client and server.
3. Understand the current legal issues towards information security.

4. Understand the concepts in performing in the DNS algorithms.
5. Understand the concepts in performing message digest.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**									**1**
CO2	**3**	**3**	**3**									**1**
CO3	**2**	**3**	**3**									**1**
CO4	**1**	**3**	**3**									**1**
CO5	**2**	**3**	**2**									**1**

****END****

(A462503) CYBER CRIME INVESTIGATION & DIGITAL FORENSICS LAB

B.Tech : V Semester

L	T	P	C
0	0	2	1

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 items in user mailboxes and public folders
2. Perform Browser history analysis and get the downloaded content, history, saved logins, 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.
8. Perform information for incident response using the crowd Response tool
9. Perform File type detection using Autopsy tool.
10. Perform Memory capture and analysis using the Live RAM capture or any forensic tool.

TEXTBOOKS:

1. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.
2. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, J. Sammons, Syngress Publishing, 2012.

REFERENCE BOOKS:

1. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010
2. Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides, C. H.Malin, E. Casey and J. M. Aquilina, Syngress, 2012
3. Brett shabers, Eric Zimerman, X-ways forensics practitioners guide

COURSE OUTCOMES

On completion of the course students will be able to

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 out the open ports for the attackers through network analysis, Registry analysis.
5. Learn how to write a forensic report.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**									**1**
CO2	**3**	**3**	**3**									**1**
CO3	**2**	**3**	**3**									**1**
CO4	**1**	**3**	**3**									**1**
CO5	**2**	**3**	**2**									**1**

****END****

(A462504) CYBER SECURITY ESSENTIALS LAB

B.Tech : V Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Implement and test simple symmetric encryption algorithms like AES and DES.
2. Implement RSA encryption to demonstrate the concept of public and private keys.
3. Set up and configure a basic firewall using tools like iptables on Linux.
4. Demonstrate DNS spoofing and DNS cache poisoning attacks.
5. Set up a proxy server and demonstrate how attackers can use proxies to hide their tracks.
6. Demonstrate basic antiforensics techniques like
    i. Deleting logs ii. Using steganography tools.
7. Perform SQL injection on a test website and then implement measures to prevent it.
8. Create a simple application vulnerable to buffer overflow and demonstrate how to exploit it.
9. Implement an XSS attack on a test web application and demonstrate ways to mitigate such attacks.
10. Analyze a simple computer virus in a controlled environment and discuss detection and prevention strategies.
11. Investigate the functioning of a rootkit and demonstrate techniques to detect it.
12. Set up a basic IDS like Snort and test its effectiveness in detecting different types of attacks.

TEXTBOOK:

1. James Graham, Richard Howard, Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor &Francis Group, 2011.

REFERENCE BOOKS:

1. Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental of Cyber Security (Principles, Theory and Practices) BPB Publications 2018

COURSE OUTCOMES:

On completion of the course students will be able to

1. Practical skills in cyber security tools and techniques.
2. Analytical problem - solving Abilities
3. SQL Injections.
4. Implementation of XSS attacks
5. Use of IDS/IPS- tools like SNORT.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**									**1**
CO2	**3**	**3**	**3**									**1**
CO3	**2**	**3**	**3**									**1**
CO4	**1**	**3**	**3**									**1**
CO5	**2**	**3**	**2**									**1**

****END****

(A400705) INTELLECTUAL PROPERTY RIGHTS

B. Tech: V Semester

L	T	P	C
2	0	0	0

UNIT I: INTRODUCTION TO INTELLECTUAL PROPERTY

Introduction, types of intellectual property, international Organizations, agencies and treaties, importance of intellectual property rights.

UNIT II: TRADEMARK

Purpose and function of trademarks, acquisition of trademark rights, protectable matter, Selecting and evaluating trademark, trademark registration processes.

UNIT-III:

LAW OF COPY RIGHTS:

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copyright registration, notice of copy right, international copy right law.

Law of Patents: Foundation of patent law, patent searching process, owner rights and transfer.

UNIT-IV: TRADE SECRETS:

Trade secret law, determination of trade secretes status' liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

UNFAIR COMPETITION**:** Misappropriation right of publicity, false advertising

UNIT-V NEW DEVELOPMENT OF INTELLECTUAL PROPERTY:

new developments in trademark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international-trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXTBOOKS & REFERENCES

1. Intellectual property right, Deborah, E. Bou choux, Cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Skill to understand the concept of intellectual property rights.
2. Develops procedural knowledge to legal System and solving the problem relating Patents.
3. Gain knowledge on development and owning of Trademark, Copy Rights, and Patents.
4. Develops conceptual exposure on legal aspects related to IPR.
5. Knowledge of different types of competition and ethical and unethical practices of advertising.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						**2**		**3**	**1**	**1**	**1**	**1**
CO2			**2**	**2**				**3**	**1**	**1**	**1**	**1**
CO3			**2**	**1**				**3**	**1**	**1**	**1**	**1**
CO4			**2**	**1**				**3**	**1**	**1**	**1**	**1**
CO5								**3**	**1**	**1**	**1**	**1**

****END****

(A462505) UI DESIGN-FLUTTER

B.Tech:V Semester

L	T	P	C
0	0	2	1

List of Experiments: Students need to implement the following experiments.

1. a) Install Flutter and Dart SDK.
   b) Write a simple Dart program to understand the language basics.

2. a) Explore various Flutter widgets (Text, Image, Container, etc.).
   b) Implement different layout structures using Row, Column, and Stack widgets.

3. a) Design a responsive UI that adapts to different screen sizes.
   b) Implement media queries and breakpoints for responsiveness.

4. a) Set up navigation between different screens using Navigator.
   b) Implement navigation with named routes.

5. a) Learn about stateful and stateless widgets.
   b) Implement state management using set State and Provider.

6. a) Create custom widgets for specific UI elements.
   b) Apply styling using themes and custom styles.

7. a) Design a form with various input fields.
   b) Implement form validation and error handling.

8. a) Add animations to UI elements using Flutter's animation framework.
   b) Experiment with different types of animations (fade, slide, etc.).

9. a) Fetch data from a REST API.
   b) Display the fetched data in a meaningful way in the UI.

10. a) Write unit tests for UI components.
    b) Use Flutter's debugging tools to identify and fix issues.

TEXTBOOK:

1.Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.

COURSE OUTCOMES:

1. Implements Flutter Widgets and Layouts
2. Responsive UI Design and with Navigation in Flutter
3. Create custom widgets for specific UI elements and also Apply styling using themes and custom. styles.
4. Design a form with various input fields, along with validation and error handling.
5. Fetches data and write code for unit Test for UI components and also animation.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**3**		**3**							**1**
CO2	**2**	**1**	**3**		**3**				**1**			**1**
CO3	**2**	**1**	**3**		**3**				**1**			**1**
CO4	**2**	**1**	**3**		**3**							**1**
CO5	**2**	**1**	**3**		**3**				**1**			**1**

****END****

(A462307) SOFTWARE ENGINEERING

B.Tech: VI Semester

L	T	P	C
3	0	0	3

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model and Agile methodology.

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT - III

Design Engineering: Design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white- box testing, validation testing, system testing, the art of debugging.

Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXTBOOKS:

1.Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.

2.Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS:

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

COURSE OUTCOMES

1. Understand the basic role and nature of software and acquire knowledge to select process framework and process model for business system.
2. Ability to translate end-user requirements into system and software requirements and able to identify, analyse, validate, manage, and specify the requirements for the development of an application.
3. Demonstrate an ability to use the Design tools for designing software architecture and conceptual model through UML diagram.
4. Concede product quality through testing techniques employing appropriate metrics by understanding the practical challenges associated with the development of a significant software system.
5. Apply the Risk management strategies, Quality management strategies and Quality Assurance knowledge for handling the Application.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3					1					2	2
CO2	3			2		1				2	2	1
CO3	2	1	3	3	3				1			
CO4	3	1	2	1	3				1			1
CO5	1					1		2			3	

****END****

(A462308) VULNERABILITY ASSESSMENT AND PENETRATION TESTING

L	T	P	C
3	0	0	3

B.Tech: VI Semester

UNIT- I

Introduction Ethics of Ethical Hacking: Why you need to understand your enemy's tactics, recognizing the gray areas in security, Vulnerability Assessment and Penetration Testing. **Penetration Testing and Tools:** Social Engineering Attacks: How a social engineering attack works, conducting a social engineering attack, common attacks used in penetration testing, preparing yourself for face-to-face attacks, defending against social engineering attacks.

UNIT- II

Physical Penetration Attacks: Why a physical penetration is important? conducting a physical penetration, Common ways into a building, defending against physical penetrations. **Insider Attacks:** Conducting an insider attack, defending against insider attacks. Metasploit: The Big Picture, Getting Metasploit, Using the Metasploit Console to Launch Exploits, Exploiting Client-Side Vulnerabilities with Metasploit, Penetration Testing with Metasploit's Meterpreter, Automating and Scripting Metasploit, Going Further with Metasploit.

UNIT- III

Managing a Penetration Test: planning a penetration test, structuring a penetration test, execution of a penetration test, information sharing during a penetration test, reporting the results of a Penetration Test. Basic Linux Exploits: Stack Operations, Buffer Overflows, Local Buffer Overflow Exploits, Exploit Development Process. Windows Exploits: Compiling and Debugging Windows Programs, Writing Windows Exploits, Understanding Structured Exception Handling (SEH), Understanding Windows Memory Protections (XPSP3, Vista, 7 and Server 2008), Bypassing Windows Memory Protections.

UNIT- IV

Web Application Security Vulnerabilities: Overview of top web application security vulnerabilities, Injection vulnerabilities, cross-Site scripting vulnerabilities, the rest of the OWASP Top Ten SQL Injection vulnerabilities, Cross-site scripting vulnerabilities. Vulnerability Analysis: Passive Analysis, Source Code Analysis, Binary Analysis.

UNIT- V

Client-Side Browser Exploits: Why client-side vulnerabilities are interesting, Internet explorer security concepts, history of client-side exploits and latest trends, finding new browser-based vulnerabilities heap spray to exploit, protecting yourself from client-side exploit. Malware Analysis: Collecting Malware and Initial Analysis: Malware, Latest Trends in Honeynet Technology, Catching Malware: Setting the Trap, Initial Analysis of Malware.

TEXTBOOKS:

•Gray Hat Hacking-The Ethical Hackers Handbook", Allen Harper, Stephen Sims, Michael Baucom, 3rd Edition, Tata Mc Graw-Hill.

•The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", Dafydd Suttard, Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, No Starch Press.
2. The Pen Tester Blueprint-Starting a Career as an Ethical Hacker ", L. Wylie, Kim Crawly, 1st Edition, Wiley Publications.

COURSE OUTCOMES

1. Learn to handle the vulnerabilities of a Web application
2. Able to learn various penetration testing tools
3. Knowledge on Metasploit, Linux exploit and windows exploit tools
4. Analyze various vulnerabilities.
5. Understanding the client browser exploits.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2							1
CO2	3	2	2		2							1
CO3	3	2	2		2							1
CO4	3	2	2		2							1
CO5	3	2	2		2							1

****END****

(A462309) NETWORK MANAGEMENT SYSTEMS AND OPERATIONS

B.Tech: VI Semester

L	T	P	C
3	0	0	3

UNIT – I

The Network Management Challenge: Introduction, The Internet and Network Management, Internet Structure, Managing an Entity, Internal and External policies, The state of Network Management, Network Management in the Gartner Model, Benefits of Automation, The Lack of Industry Response, Distributed Systems and new abstractions. A **Review of Network Elements and Services:** Introduction, Network Devices and Network Services, Network Elements and Element Management, Effect of physical organization on Management, Examples of Network Elements and Services Basic Ethernet Switch, VLAN Switch, Access Point for a Wireless LAN, Cable Modem System, DSL Modem System and DSLAM, CSU/DSU used in Wide Area Digital Circuits, Channel Bank, IP Router, Firewall, DNS Server, DHCP Server, Web Server, HTTP Load Balancer.

UNIT - II

The Network Management Problem: Introduction, what is Network Management? The scope of Network Management, variety and multi-vendor environments, element and network management systems, scale and complexity, types of networks, classification of devices. **Configuration and Operation:** Introduction, Intuition for configuration, configuration and protocol layering, dependencies among configuration parameters, seeking a more precise definition of configuration, configuration and temporal consequences, configuration and global consistency, global state and practical systems, configuration and default values, partial state, automatic update and recovery, Interface paradigm and incremental configuration, commit and rollback during configuration, automated rollback and timeout, snapshot, configuration, and partial state, separation of setup and activation.

UNIT – III

Fault Detection and Correction: Introduction, Network Faults, Trouble Reports, Symptoms, and causes, Troubleshooting and Diagnostics, Monitoring, Baselines, Items that can be Monitored, Alarms, Logs, and Polling, Identifying the cause of a Fault, Human Failure and Network Faults, Protocol Layering and Faults, Hidden Faults and Automatic Correction, Anomaly Detection and Event Correlation, Fault Prevention. Performance Assessment and Optimization: Introduction, aspects of performance, Items that can be measured, measures of network performance, application and endpoint Sensitivity degraded service, variance in traffic and congestion, congestion, delay and utilization, local and end-to-end measurements, passive observation Vs. active probing, bottlenecks and future planning, capacity Planning, planning the capacity of a switch, planning the capacity of a router, planning the capacity of an Internet connection, measuring peak and average traffic on a link, estimated peak utilization and 95th percentile, the relationship between average and peak utilization.

UNIT - IV

Security: Introduction, The illusion of a secure network, security as a process, security terminology and concepts, management goals related to security, Risk Assessment, Security policies, acceptable use policy, basic technologies used for security, management issues and security, Security architecture: Perimeter Vs. Resources, element coordination and firewall unification, resource limits and denial of service, management of authentication, access control and user authentication, management of wireless networks, security of the network, role-based access control, audit trails and security logging, key management.

UNIT – V

Management Tools and Technologies: Introduction, the principle of most recent change, the evolution of Management tools, management tools as applications, using a separate network for management, types of management tools, physical layer testing tools, reachability and connectivity tools (ping), packet analysis tools, discovery tools, device interrogation interfaces and tools, event monitoring tools, triggers, urgency levels and Granularity, events, urgency levels and traffic, performance monitoring, flow analysis tools, routing and traffic engineering tools, configuration tools, security enforcement tools, network planning tools, integration of management tools, NOCs and remote monitoring, remote CLI access, Remote Aggregation of Management Traffic.

TEXTBOOK:

1. Automated Network Management Systems, D. Comer, Prentice Hall, 2006, ISBN No. 0132393085.

REFERENCE BOOKS:

1. Nagios Core Administration Cookbook - Second Edition, Tom Ryder, 2016, Packet Publishing, ISBN: 781785889332.
2. Terraform: Up and Running, Yevgeniy Brikman, 2017, O'Reilly Media, Inc., ISBN:
3. Applied Network Security Monitoring, Chris Sanders, Jason Smith, Syngress publications

COURSE OUTCOMES:

1. Understanding the challenges and structure of network management in the context of the Internet.
2. Defining network management and comprehending its scope, challenges, and variety in multivendor environments.
3. Identifying and diagnosing network faults
4. Understanding trouble reports and learning troubleshooting techniques.
5. Exploring the various network management tools.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**		**2**							**1**
CO2	**3**	**2**	**2**		**2**							**1**
CO3	**3**	**2**	**2**		**2**							**1**
CO4	**3**	**2**	**2**		**2**							**1**
CO5	**3**	**2**	**2**		**2**							**1**

****END****

(A462310) COMPILER DESIGN

L	T	P	C
2	0	0	2

B.Tech: VI Semester

UNIT -I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical- Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT –II

Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT –III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT –IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT –V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXTBOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D.Ullman, 2nd Edition, Pearson.

Reference Books:

1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

COURSE OUTCOMES

On completion of the course students will be able to

1. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
2. Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
3. Design and implement LL and LR parsers.
4. Design algorithms to do code optimization to improve the performance of a program in terms of space and time complexity.
5. Design algorithms to generate machine code.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**									**1**
CO2	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO3	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO4	**2**	**3**	**3**	**2**	**1**							**1**
CO5	**2**	**3**	**3**		**1**							**1**

****END****

(A462506) COMPILER DESIGN LABORATORY

B. Tech: VI Semester

L	T	P	C
0	0	2	1

Implementation of symbol table.

1. Develop a lexical analyzer to recognize a few patterns inc (ex. Identifiers, constants, comments, operators etc.)

2. Implementation of lexical analyzer using lex tool.
3. Generate yacc specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +,-, * and /.
   b) Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
   c)Implementation of calculator using lex and yacc.
4. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
5. Implement type checking.
6. Implement any one storage allocation strategies (heap, stack, static)
7. Write a lex program to count the number of words and number of lines in a given file or program.
8. Write a 'C' program to implement lexical analyzer using c program.
9. write recursive descent parser for the grammar.
   E->E+T E->T T->T*F T->F F->(E)/id.
10. write recursive descent parser for the grammar.
    S->(L) S->a L->L, S L->S
11. Write a C program to calculate the first function for the grammar.
    E->E+T E->T T->T*F T->F F->(E)/id
12. Write a YACC program to implement a top-down parser for the given grammar.
13. Write a YACC program to evaluate algebraic expression.

TEXTBOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Design, develop, and implement a compiler for any language.
2. Use lex and yacc tools for developing a scanner and a parser.
3. Design and implement LL and LR parsers.
4. Performing the top-down parsing techniques.
5. Performing the bottom down parsing techniques.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**									**1**
CO2	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO3	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO4	**2**	**3**	**3**	**2**	**1**							**1**
CO5	**2**	**3**	**3**		**1**							**1**

****END****

(A462507) VULNERABILITY ASSESSMENT & PENETRATION TESTING LAB

B.Tech: VI Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Implement Monitoring of Network Traffic using
    a. a.wireshark b. tcpdump c. Nagios d. solarwinds

2. Implement Host & Services Discovery using Nmap, massscan.

3. Implement Vulnerability Scanning using OpenVAS, Zapproxy, SQLmap.

4. Implement Internal Penetration Testing.
    a. Mapping b. Scanning c. Gaining access through CVE's
    b. d. Sniffing POP3/FTP/Telnet Passwords e. ARP Poisoning f. DNS Poisoning

5. Implement External Penetration Testing.
    a. a.Evaluating external Infrastructure.
    b. b.Creating a topological map & identifying IP address of target.
    c. c.Lookup domain registry for IP information.
    d. d.Examining use of IPV6 at remote location.

6. Implement Vulnerability scanning with Nessus.

7. Implement Vulnerability scanning with OpenVAS.

8. Implement Web application assessment with nikto.

9. Implement Web application assessment with burp suite.

10. Implement Web application assessment with owaspzap,

TEXTBOOKS:

1. Gray Hat Hacking-The Ethical Hackers Handbook", Allen Harper, Stephen Sims, Michael Baucom 3rd Edition, Tata Mc Graw-Hill.
2. The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", Dafydd Suttard Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, No Starch Press.

2. ” The Pen Tester Blueprint-Starting a Career as an Ethical Hacker “, L. Wylie, Kim Crawly, 1st Edition, Wiley Publications.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Design for monitoring network traffic.
2. Perform different penetration testing methods.
3. Design different types of vulnerabilities scanning.
4. Understand web application assessment.
5. Implementation of Burpsuite

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**									**1**
CO2	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO3	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO4	**2**	**3**	**3**	**2**	**1**							**1**
CO5	**2**	**3**	**3**		**1**							**1**

****END****

(A462508) NETWORK MANAGEMENT SYSTEMS AND OPERATIONS LAB

B.Tech: VI Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Network Discovery and Mapping
    A. Utilize tools like Nmap and Wireshark to perform network discovery.
    B. Create a visual map of the network infrastructure.
    C. Analyze the implications of the network structure on management strategies.
2. Policy Implementation and Compliance
    A. Use tools like Snort or Suricata for intrusion detection.
    B. Implement firewall rules with tools such as iptables or pf Sense.
    C. Assess compliance with security policies and regulatory requirements.
3. Automation with Ansible
    A. A.S et up Ansible for network configuration management.
    B. Automate routine tasks such as software updates and configuration changes.
    C. Evaluate the impact of automation on efficiency and responsiveness.
4. Fault Detection with Wireshark and Nagios
5. Protocol Analysis with TCP dump
6. Traffic Analysis with Wireshark and Bandwidth
7. Traffic Measurement with Ntopng
8. Threat Modeling with OWASP Cornucopia
9. Risk Assessment with OpenVAS
10. Firewall Configuration with pf Sense
11. Network Discovery with Nmap
12. Security Enforcement with Snort

TEXT BOOK:

1. Automated Network Management Systems, D. Comer, Prentice Hall, 2006, ISBN No. 0132393085

REFERENCE BOOKS:

1. Nagios Core Administration Cookbook - Second Edition, Tom Ryder, 2016, Packet Publishing, ISBN: 781785889332.
2. Terraform: Up and Running, Yevgeniy Brikman, 2017, O'Reilly Media, Inc., ISBN: 9781491977088 optimizations.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understanding the challenges and structure of network management in the context of the Internet.
2. Defining network management and comprehending its scope, challenges, and variety in multivendor environments.
3. Identifying and diagnosing network faults, understanding trouble reports, and learning troubleshooting techniques.
4. Exploring the various network management tools.
5. Performing tools like Nmap/Snort/Suricata

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**									**1**
CO2	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO3	**3**	**3**	**3**	**1**	**3**					**1**		**2**
CO4	**2**	**3**	**3**	**2**	**1**							**1**
CO5	**2**	**3**	**3**		**1**							**1**

****END****

(A400504) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

(Common to all branches)

L	T	P	C
0	0	2	1

INTRODUCTION

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

UNIT-I:

Functional English: Starting a conversation, responding appropriately and relevantly, using the right body language, Role play in Different Situations.

UNIT-II:

Vocabulary Building: Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrasal verbs.

UNIT-III:

Group Discussion: Dynamics of group discussion, intervention, summarizing, modulation of voice, body language a, relevance, fluency and coherence.

UNIT-IV:

Interview Skills: Concept and process, pre-interview planning, opening strategies, answering strategies, Interview through tale and video- conferencing.

UNIT-V:

Resume` and Technical Report Writing: Structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, Letter-writing.
Reading Comprehension: Reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

Lab Manual:

1. Adavanced English Communication Skills: ICS & CALL lab Activity

REFERENCES

1. The Basics of Communication: A Relational Perspective, Stev Duck & David T. Mc Mahan. Sage South Asia Edition. Sage Publications (2012)
2. English Vocabulary in Use series, Cambridge University Press 2008 Barron's – The leader in test preparation 2nd Edition
3. Philip Geer, Barron's – Essential words for the GRE – 3rd Edition PS .Bright-Manual for Group Discussion
4. R Guptas ,Anand Ganguly, Group and Interviews .

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain the rules of formal and informal situational dialogues and develop verbal & nonverbal communication skills.
2. Build academic vocabulary, use a variety of accurate sentence structure and utilize digital literacy tools to develop writing and grammar skills.
3. Express clarity of thoughts, capability to hold the discussion with everyone and develop analytical thinking.
4. Develop the skills needed for approaching different types of interviews Illustrate the report writing and summarize the main ideas of report; apply key elements of structure and style in drafting loner documents.
5. Read an increasing range of different types of texts by combining contextual, semantic, grammatical and phonic knowledge and summarize the personal details, Customize the objectives statement for each position they are applying for job.

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	-	-	-	-	-	-	-	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**3**	-	-	-
CO3	-	-	-	-	-	-	-	-	**2**	**3**		-
CO4	-	-	-	-	-	-	-	-	**2**	-	-	-
CO5	-	-	-	-	-	-	-	-	-	**3**	-	-

**** END****

(A462802) BIG DATA-SPARK

	L	T	P	C
B.Tech: VI Semester	**0**	**0**	**4**	**2**

List of Experiments:

1. To Study of Big Data Analytics and Hadoop Architecture (i) know the concept of big data architecture (ii) know the concept of Hadoop architecture
2. Loading DataSet in to HDFS for Spark Analysis Installation of Hadoop and cluster management
    i. Installing Hadoop single node cluster in ubuntu environment
    ii. Knowing the differencing between single node clusters and multi-node clusters
    iii. Accessing WEB-UI and the port number
    iv. Installing and accessing the environments such as hive and sqoop
3. File management tasks & Basic linux commands
    a. (i)Creating a directory in HDFS
    b. (ii)Moving forth and back to directories
    c. (iii)Listing directory contents
    d. (iv)Uploading and downloading a
    e. file in HDFS
    f. (v)Checking the contents of the file
    g. (vi)Copying and moving files
    h. (vii)Copying and moving files between local to HDFS environment
    i. (viii)Removing files and paths
    j. (ix)Displaying few lines of a file (x) Display the aggregate length of a file
    k. (xi)Checking the permissions of a file
    l. (xii)Zipping and unzipping the files with & without permission pasting it to a location
    m. (xiii)Copy, Paste commands
4. Map-reducing
    a. (i)Definition of Map-reduce
    b. (ii)Its stages and terminologies
    c. (iii)Word-count program to understand map-reduce (Mapper phase, Reducer phase, Driver code)
5. Implementing Matrix-Multiplication with Hadoop Map-reduce
6. Compute Average Salary and Total Salary by Gender for an Enterprise.

7. (i) Creating hive tables (External and internal)
    a. (ii)Loading data to external hive tables from SQL tables(or)Structured c.s.v using scoop
    b. (iii)Performing operations like filtration and updations.

c. (iv)Performing Join (inner, outer etc)
d. (v)Writing User defined function on hive tables

8. Create a sql table of employees Employee table with designation Salary table (salary, dept id) Create external table in hive with similar schema of above tables, Move data to hive using scoop and load the contents into tables, filter a new table and write a UDF to encrypt the table with AES-algorithm, Decrypt it with key to show contents
9. (i) Pyspark Definition (Apache Pyspark) and difference between Pyspark, Scala, pandas (ii)Pyspark files and class methods
    a. (iii)get (file name) (iv) get root directory ()
10. Pyspark -RDD'S
    a. (i)what is RDD's?
    b. (ii)ways to Create RDD
    c. (iii)parallelized collections
    d. (iv)external dataset
    e. (v)existing RDD's
    f. (vi)Spark RDD's operations (Count, foreach (), Collect, join, Cache()
11. Perform pyspark transformations
    a. (i)map and flat Map
    b. (ii)to remove the words, which are not necessary to analyze this text.
    c. (iii)group By
    d. (iv)What if we want to calculate how many times each word is coming in corpus ?
    e. (v)How do I perform a task (say count the words 'spark' and 'apache' in rdd3) separately on each partition and get the output of the task performed in these partition? (vi)unions of RDD (vii) join two pairs of RDD Based upon their key
12. Pyspark sparkconf-Attributes and applications
    a. (i)What is Pyspark spark conf ()
    b. (ii)Using spark conf create a spark session to write a data frame to read details in a c.s.v and later move that c.s.v to another location.

TEXTBOOKS:

1. Spark in Action, Marko Bonaci and Petar Zecevic, Manning.
2. PySpark SQL Recipes: With HiveQL, Dataframe and Graphframes, Raju Kumar Mishra and Sundar Rajan Raman, Apress Media.

WEB LINKS:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0133015058445189122518 2_shared/overview
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0125838811963883524 2_s hared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126052684230082561 69 2 _shared/overview

COURSE OUTCOMES:

On completion of the course students will be able to

1. Develop MapReduce Programs to analyze large dataset Using Hadoop and Spark
2. Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its Components
3. Perform the filter, count, distinct, map, flatMap RDD Operations in Spark.
4. Build Queries using Spark SQL
5. Apply Spark joins on Sample Data Sets

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**3**		**3**							**1**
CO2	**2**	**1**	**3**		**3**				**1**			**1**
CO3	**2**	**1**	**3**		**3**				**1**			**1**
CO4	**2**	**1**	**3**		**3**							**1**
CO5	**2**	**1**	**3**		**3**				**1**			**1**

****END****

(A400102) BUSINESS ECONOMICS & FINANCIAL ANALYSIS

B. Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT -I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT -II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Deand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III

Production Analysis:

Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT-IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT-V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXTBOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

COURSE OBJECTIVES:

1. To understand the basic concepts of economics and different forms of business organizations
2. To create awareness on basics of business economics and to analyse the concepts of demand and supply
3. To describe each stage of product life cycle with the help different costs and their role in maintaining optimum cost of production and overall profitability by considering different market competitions
4. To acquaint with the basic accounting knowledge and financial accounting process
5. To evaluate the performance of the organization using various ratios

COURSE OUTCOMES:

After completion of the course, the student should be able to

1. Perform decision making function effectively in an uncertain framework by applying the based concepts of economics and select suitable form of business organization which meets the requirements of business
2. Take the right decisions towards buying and selling of goods and services based on the demand and supply dynamics in the markets
3. Fix the right price based upon production cost which can best meet the pre- determined objectives of the business under different market conditions
4. Prepare book of accounts and understand overall position of the business
5. Interpret the firm's financial performance using various ratios

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2										3	1
CO2				2						3		
CO3					3			2				
CO4		3									2	
CO5				2				3				

****END****

(A400103) ORGANIZATIONAL BEHAVIOR

B. Tech: VII Semester

L	T	P	C
2	0	0	2

UNIT- I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour.

Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management

UNIT-II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality- Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT- III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making.

Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict

UNIT- IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern workplace.

UNIT- V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders

Textbooks:

1. Stephen P.Robins, Organizational Behavior, Phi learning Pearson Education, 11th edition 2008
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008.
10. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009
11. Mullins: Management and Organisational Behaviour, Pearson, 2008.
12. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
13. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008

COURSE OUTCOMES:

1. To understand the conceptual framework of the discipline of OB and its practical applications in the organizational set up.
2. To deeply understand the role of individual, groups and structure in achieving organizational goals effectively and efficiently.
3. To critically evaluate and analyze various theories and models that contributes in the overall understanding of the discipline.
4. To develop creative and innovative ideas that could positively shape the organizations.
5. To accept and embrace in working with different people from different cultural and diverse background in the workplace.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		**2**										**3**
CO2					**2**				**3**			
CO3				**3**					**2**	**1**		
CO4		**2**										**3**
CO5			**2**				**3**					

****END****

(A462401) ARTIFICIAL INTELLIGENCE
(Professional Elective – I)

	L	T	P	C
B.Tech: V Semester.	**3**	**0**	**0**	**3**

UNIT - I

Introduction to AI, Intelligent Agents, problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening. Depth-first search, Bidirectional search, Informed (Heuristic) Search **Strategies**: Greedy best-first. search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated. annealing search, Local Search in Continuous Spaces.

UNIT - II

Problem Solving by Search-II and Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-**Time Decisions**. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite. clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III

Logic and Knowledge Representation

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

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

UNIT - IV

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

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

UNIT - V

Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference

in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning. Dempster-Shafer theory.

TEXTBOOK:

- Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

- Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)
- Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
- Artificial Intelligence, Shivani Goel, Pearson Education.
- Artificial Intelligence and Expert systems – Patterson, Pearson Education.

COURSE OUTCOMES:

1. Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
2. Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
3. Learn different knowledge representation techniques.
4. Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
5. Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**			**2**							**1**
CO2	**3**	**3**			**2**							**1**
CO3	**3**	**3**			**2**							**1**
CO4	**3**	**3**			**2**							**1**
CO5	**3**	**3**			**2**							**1**

****END****

(A462402) DATA WARE HOUSING AND DATA MINING
(Professional Elective – I)

B.Tech: V Semester

L	T	P	C
3	0	0	3

UNIT-I

Data Warehousing: Introduction to Data warehouse, differences between operational Database Systems and warehouses, Data Warehouse Architecture and its components, Data Warehouse Characteristics, ETL, Multi-Dimensional data model, Schema Design-Star-Snowflake-Galaxy Schema, Fact Table, Types of fact tables, Dimension Table characteristics, OLAP Cube and Operations, OLAP Server Architecture-ROLAP, MOLAP, HOLAP.

UNIT –II

Introduction to Data Mining: Introduction, what is data mining, Definition, KDD process, issues in Data Mining, Data mining Tasks.

Data Preprocessing: Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Data transformation, Discretization, Concepts Hierarchy Generation, Measures of Similarity and Dissimilarity-Basics

UNIT –III

Association Rule Mining: Problem Definition, Frequent Item Set Generation, The Apriori principle, Support and Confidence measure, Association Rules Generation: Apriori Algorithm, FP-Growth Algorithms, Compact Representation of Frequent Item Set (Maximal and Closed Frequent Item sets)

UNIT –IV

Classification: Problem definition, General approaches to solve Classification problems, Evaluation of a Classifier, Classification techniques, Decision Tree - Decision tree construction, Methods for Expressing attribute test condition, Measures for selecting the Best Split, Algorithm for Decision tree Induction, Naive Bayes Classifiers, Bayesian Belief Networks, K -Nearest neighbor classification algorithm & characteristics.

UNIT –V

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, K-Means Clustering, K-Means additional Issues, PAM Algorithm, Hierarchical Clustering Agglomerative methods and divisive methods, Basic Agglomerative Hierarchical clustering algorithms, Specific techniques, Key issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.

TEXTBOOKS:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India.

2. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education

REFERENCE BOOKS:

1. Data Mining Techniques – Arun K Pujari, University Press.
2. Data Warehousing in the Real World – Sam Anahory& Dennis Murray. Pearson Edn Asia.
3. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition

COURSE OUTCOMES:

1. Explain why the data warehouse in addition to database systems.
2. Perform the pre-processing of data and apply mining techniques on it.
3. Identify the association rules, classification and clusters in large data sets.
4. Solve real world problems in business and scientific information using data mining.
5. Compare and Contrast various Clustering Algorithms.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**		**3**									**1**
CO2	**3**	**2**	**2**									**1**
CO3	**3**	**3**	**3**									**1**
CO4	**3**	**2**	**2**	**2**								**1**
CO5	**3**	**2**	**2**									**1**

****END****

(A462403) AD-HOC & SENSOR NETWORKS
(Professional Elective – I)

	L	T	P	C
B.Tech: V Semester	**3**	**0**	**0**	**3**

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; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-REAM, Quorum-based.

Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AM Route, MCEDAR.

UNIT - III

Geocaching: Data-transmission Oriented-LBM; Route Creation Oriented-Geo TORA, 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:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understanding the concepts in MANETs

2. Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks.
3. Ability to solve the issues in real-time application development based on ASN.
4. Ability to conduct further research in the domain of ASN.
5. Understanding the concepts in WSN's.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										**1**
CO2	**3**	**2**	**2**									**1**
CO3	**3**	**2**	**2**									**1**
CO4	**3**	**2**	**2**	**1**								**1**
CO5	**3**	**2**										**1**

****END****

(A462404) CYBER LAWS
(Professional Elective- I)

	L	T	P	C
B.Tech: V Semester	**3**	**0**	**0**	**3**

UNIT – I

Introduction: History of Internet and World Wide Web, Need for cyber law, Cybercrime on the rise, Important terms related to cyber law.

Cyber law in India: Need for cyber law in India, History of cyber law in India.

Information Technology Act, 2000: Overview of other laws amended by the IT Act, 2000, National Policy on Information Technology 2012.

UNIT - II

Overview of the Information Technology Act, 2000: Applicability of the Act, Important provisions of the Act: Digital signature and electronic signature, Digital Signature under the IT Act, 2000, E Governance Attribution, Acknowledgement and Dispatch of Electronic Records, Certifying Authorities, Electronic Signature Certificates, Duties of Subscribers, Penalties and Offences, Intermediaries.

UNIT - III

Overview of rules issued under The IT Act, 2000, Electronic Commerce, Electronic Contracts, Cyber Crimes, Cyber Frauds.

UNIT - IV

Regulatory Authorities: Department of Electronics and Information Technology, Controller of Certifying Authorities (CCA), Cyber Appellate Tribunal, Indian Computer Emergency Response Team (ICERT), Cloud Computing, Case Laws.

UNIT – V

Introduction to Cybercrime and procedure to report Cybercrime: procedure to report cybercrime, some basic rules for safe operations of the computer and internet, the criminal law (amendment) act, 2013: legislative remedies for online harassment and cyberstalking in India.

TEXTBOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGraw Hill,2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning.

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison-Wesley Pearson Education
2. Forensic Compiling, A Practitioner is Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

COURSE OUTCOMES:

1. Students will understand the usage of computers in forensics, and how to use various forensic tools for a wide variety of investigations.
2. It gives an opportunity to students to continue their zeal in research in computer forensics. Learn evolution and key aspects of Indian cyber law, including recent amendments.
3. Gain knowledge about the legalities of digital signatures and the role of e-governance in the IT Act.
4. Develop an understanding of the legalities involved in electronic contracts and international conventions.
5. Adapt in understanding and analyzing cybercrime, electronic evidence, and intellectual property rights in the context of IT.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**									**1**
CO2	**3**	**2**	**1**			**2**		**2**				**1**
CO3	**3**	**2**	**1**			**2**		**2**				**1**
CO4	**3**	**2**	**1**		**2**	**2**		**2**				**1**
CO5	**3**	**2**	**1**		**2**	**2**		**2**				**1**

****END****

(A462405) MOBILE& WIRELESS SECURITY
(Professional Elective- II)

B.Tech: VI Semester

L	T	P	C
3	0	0	3

UNIT-I

Security in General Wireless/Mobile Networks: High Performance Elliptic Curve Cryptographic Co-processor, An Adaptive Encryption Protocol in Mobile Computing

UNIT- II

Security in Wireless LANs: Cross Domain Mobility Adaptive Authentication, AAA Architecture and Authentication for wireless LAN Roaming, Experimental Study on Security Protocols in WLANs

UNIT-III

Security in Ad Hoc Networks: Pre-authentication and authentication models in Ad Hoc Networks, Promoting Identity-based key management, attacks and counter measures, Secure and resilient data aggregation, Secure routing in MANET, Intrusion Detection System in MANET

UNIT- IV

Security in Mobile Cellular Networks: Security issues in GSM, 3G and 4G networks, Authentication and encryption, Security concerns in 5Gnetworks.

UNIT- V

Security in Sensor Networks and IoT: Security Issues, Key Management Schemes, Secure Routing in Sensor Networks, Energy-aware security mechanisms, Security and privacy issues in IoT, Identity and access management, Data Integrity, Best practices for IoT security.

TEXT BOOKS:

- Lei Chen, Jiahuang Ji, Zihong Zhang, Wireless Network Security, Springer Science & Business Media
- W.Stallings. Cryptography & Network Security: Principles and Practice, Prentice Hall Noureddine Boudriga, Security of Mobile Communications, CRC Press

REFERENCE BOOKS:

1. Levente Buttyán and Jean-Pierre Hubaux, Security and Cooperation in Wireless Networks, Cambridge University Press
2. James Kempf, Wireless Internet Security: Architectures and Protocols, Cambridge University Press
3. Patrick Traynor, Patrick McDaniel, and Thomas LaPorta, Security for Telecommunications Networks, Springer

4. Frank Adelstein, Sandeep K.S.Gupta, Golden G.Richard III, and Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, McGraw-Hill Professional

COURSE OUTCOMES:

1. Understanding the modern concept and foundation of Mobile security.
2. Understand and classify various next generation networks.
3. Identity various sources of vulnerabilities from Mobile.
4. Analyze network security attacks and their counter measures.
5. Understand the security Issues in IoT.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**			**1**							**1**
CO2	**3**	**2**			**1**							**1**
CO3	**3**	**2**			**1**							**1**
CO4	**3**	**2**	**2**		**1**							**1**
CO5	**3**	**2**			**1**	**2**						

****END****

(A462406) ETHICAL HACKING

(Professional Elective- II)

L	T	P	C
3	0	0	3

B.Tech:VI Semester

UNIT- I

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking.

UNIT- II

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement.

UNIT - III

Preparing for a Hack: Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

UNIT - IV

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, Rootkits, applications, War dialing, Network, Services and Areas of Concern.

UNIT - V

Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion.

TEXTBOOK:

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press.

REFERENCE BOOKS:

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning.
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Gain the knowledge of the use and availability of tools to support an ethical hack.
2. Gain the knowledge of interpreting the results of a controlled attack.
3. Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
4. Comprehend the dangers associated with penetration testing.
5. Understanding the rootkits, war dailing.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**									**1**
CO2	**3**	**2**	**1**			**2**		**2**				**1**
CO3	**3**	**2**	**1**			**2**		**2**				**1**
CO4	**3**	**2**	**1**		**2**	**2**		**2**				**1**
CO5	**3**	**2**	**1**		**2**	**2**		**2**				**1**

****END****

(A462407) CYBER FORENSICS

(Professional Elective- II)

L	T	P	C
3	0	0	3

B.Tech: VI Semester

UNIT- I

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive.

UNIT - III

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.

UNIT -IV

Current 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:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison-Wesley Pearson Education
2. Forensic Compiling, A Practitioner is Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Students will understand the usage of computers in forensics, and how to use various forensic tools for a wide variety of investigations.
2. It gives an opportunity to students to continue their zeal in research in computer forensics.
3. Analyze the importance of a systematic procedure for investigation of data found on digital storage media.
4. Use the file system storage mechanisms and retrieve files in hidden format.
5. Apply the computer forensics tools used in data analysis.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**3**	**1**							**1**
CO2	**3**	**2**	**2**	**3**	**1**							**1**
CO3	**3**	**3**	**3**	**2**	**2**	**2**						**1**
CO4	**3**	**3**	**3**	**2**	**2**	**2**						**1**
CO5	**3**	**3**	**3**	**2**	**3**	**2**						**1**

****END***

(A462408) CLOUD COMPUTING

(Professional Elective- II)

B.Tech: VI Semester

L	T	P	C
3	0	0	3

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue, service, Microsoft, Windows Azure

TEXTBOOKS:

1. Essentials of cloud Computing: K. Chandrasekharan, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej,M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain Distributed System Modelling, Clustering and Virtualization
2. Discuss basic concepts of cloud computing.
3. Distinguish Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS/SAAS).
4. Design & implement cloud computing applications.
5. Explore some important cloud computing driven commercial systems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3				1					
CO2	1	2	1				1					1
CO3	1	2	1	2	2		1					1
CO4	1	3	3	1	2		1					1
CO5	1	2	2	3	2	3	1	2				1

****END****

(A462409) DATA PRIVACY
(Professional Elective – III)

B.Tech:VII Semester

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Data Privacy: Overview of Data Privacy, Importance of Data Privacy, Protecting Sensitive Data, Use Cases for Data Sharing, Methods of Protecting Data, Balancing Data Privacy and Utility, Introduction to Anonymization Design Principles.

Nature of Data in the Enterprise: Multidimensional Data, Transaction Data, Longitudinal Data, Graph Data, Time Series Data.

UNIT - II

Static Data Anonymization I: Multidimensional Data: -Introduction, Classification of Privacy-Preserving Methods, Classification of Data in a Multidimensional Data: Protecting explicit identifiers protecting Quasi-identifiers, Group Based Anonymization: k-Anonymization, I-Diversity, t-Closeness, Algorithm Comparison.

UNIT - III

Static Data Anonymization II: Complex Data Structures- Introduction, Privacy Preserving Graph Data, Privacy-Preserving Time Series Data, Privacy Preservation of Longitudinal Data, Privacy Preservation of Transaction Data.

UNIT - IV

Threats to Anonymized Data: Threats to Anonymized Data, Threats to Data Structures, Multidimensional Data, Longitudinal Data, Graph Data, Time Series Data, Transaction Data, Threats by Anonymization Techniques: Randomization, k-Anonymization, l-diversity, t-closeness.

UNIT - V

Privacy-Preserving Data Mining: Introduction, Data Mining: Key Functional Areas of Multidimensional Data, Privacy-Preserving Test Data Manufacturing, Test Data Fundamentals, Privacy Preservation of Test Data. Synthetic Data Generation: Introduction, Synthetic Data and Their Use, Privacy and Utility in Synthetic Data, Dynamic Data Protection: Tokenization Introduction, Understanding Tokenization, Use Cases for Dynamic Data Protection, Benefits of Tokenization Compared to Other Methods, Components for Tokenization.

TEXTBOOKS:

1. Nataraj Venkataramanan, Ashwin Sriram, Data Privacy: Principles and Practice, 2016, 1st Edition, Taylor & Francis. (ISBN No.: 978-1-49-872104-2), United Kingdom.
2. L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MIT Computer Science, 2002.

REFERENCE BOOKS:

1. **1.** B. Raghunathan, the Complete Book of Data Anonymization: From Planning to Implementation, 1st Edition, CRC press.
2. **2.** Nishant Bhajaria, Data Privacy: A runbook for engineers, Manning Publications.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Outline essential rules and principles for safeguarding privacy and personally identifiable information.
2. Develop data that facilitates meaningful statistical inference while minimizing the exposure of sensitive information.
3. Identify potential threats related to different types of anonymized data.
4. Classify and evaluate methods for generating test data with a focus on both privacy and utility considerations.
5. Understanding the concepts of data privacy.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										**1**
CO2	**3**	**2**	**2**		**1**							**1**
CO3	**3**	**2**						**1**				**1**
CO4	**3**	**2**										**1**
CO5	**3**	**2**			**2**			**2**				**1**

****END****

(A462410) MACHINE LEARNING
(PROFESSIONAL ELECTIVE-III)

	L	T	P	C
B. Tech: VII Semester	**3**	**0**	**0**	**3**

UNIT - I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: –
Perceptron – Linear Separability – Linear Regression.

UNIT - II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

UNIT - III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms.

UNIT - IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT – V

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo– Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TEXTBOOK:

Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.

2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the concepts of computational intelligence like machine learning.
2. Ability to get the skill to apply machine learning techniques to address real time problems in different areas.
3. Understand the Neural Networks and their usage in machine learning application.
4. Understand the various algorithms in machine learnings.
5. Design an ensembler to increase the classification accuracy

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**		**3**		**2**							**1**
CO2	**3**	**2**	**2**		**1**							**1**
CO3	**3**		**3**		**2**							**1**
CO4	**3**	**2**	**3**									**1**
CO5	**3**	**2**	**2**		**1**							**1**

****END****

(A462411) IOT SECURITY

(PROFESSIONAL ELECTIVE-II)

L	T	P	C
3	0	0	3

B.Tech: V Semester

UNIT - I

Fundamentals of IoT and Security and its need, Prevent Unauthorized Access to Sensor Data, Block ciphers, Introduction to Blockchain, Introduction of IoT devices, IoT Security Requirements, M2M Security, Message integrity, Modeling faults and adversaries, Difference among IoT devices computers, and embedded devices.

UNIT - II

IoT and cyber-physical systems RFID Security, Authenticated encryption Byzantine Generals problem sensors and actuators in IoT. IoT security (vulnerabilities, attacks, and countermeasures), Cyber Physical Object Security, Hash functions, Consensus algorithms and their scalability problems, Accelerometer, photoresistor, buttons.

UNIT - III

Security engineering for IoT development Hardware Security, Merkle trees and Elliptic curves digital signatures, verifiable random functions, Zero-knowledge systems motor, LED, vibrator. IoT Security lifecycle, Front-end System Privacy Protection, Management, Secure IoT Databases, Public-key crypto (PKI), blockchain, the challenges, and solutions, analog signal vs. digital signal.

UNIT - IV

Data Privacy Networking Function Security Trees signature algorithms proof of work, Proof of stake, Networking in IoT, Device/User Authentication in IoT IoT Networking Protocols, Crypto-currencies, alternatives to Bitcoin consensus, Bitcoin scripting language and their use Real-time communication.

UNIT - V

Introduction to Authentication Techniques Secure IoT Lower Layers, Bitcoin P2P network, Ethereum and Smart Contracts, Bandwidth efficiency, Data Trustworthiness in IoT Secure IoT Higher Layers, Distributed consensus, Smart Contract Languages and verification challenges data analytics in IoT - simple data analyzing methods.

TEXTBOOKS:

1. B. Russell and D. Van Duren, "Practical Internet of Things Security," Packet Publishing, 2016.
2. FeiHU, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations", CRC Press, 2016.
3. Narayanan et al., "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction," Princeton University Press, 2016.

REFERENCE BOOKS:

1. A. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies," O'Reilly, 2014.
2. T. Alpcan and T. Basar, "Network Security: A Decision and Game-theoretic Approach," Cambridge University Press, 2011.
3. Security and the IoT ecosystem, KPMG International, 2015.
4. Internet of Things: IoT Governance, Privacy and Security Issues" by European Research Cluster.
5. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond", NCC Group, 2014
6. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Incorporate the best practices learnt to identify the attacks and mitigate the same.
2. Adopt the right security techniques and protocols during the design of IoT products.
3. Assimilate and apply the skills learnt on ciphers and blockchains when appropriate.
4. Describe the essential components of IoT.
5. Find appropriate security/privacy solutions for IoT

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										1
CO2	3	3	3		1							1
CO3	3	3	3		1							1
CO4	3	2	2		2		1					1
CO5	3	2	3		2		1					1

****END****

(A462412) BLOCKCHAIN TECHNOLOGY
(PROFESSIONAL ELECTIVE-III)

L	T	P	C
3	0	0	3

B. Tech: VII Semester

UNIT - I

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future. Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol. Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

UNIT – II

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain. Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT - III

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda. Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT – IV

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT – V

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services, Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.
Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain.
Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXTBOOKS:

1. "Blockchain Technology", Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

REFERENCE BOOKS:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understanding concepts behind crypto currency
2. Applications of smart contracts in decentralized application development
3. Understand frameworks related to public, private and hybrid blockchain.
4. Create blockchain for different application case studies.
5. Understanding the Blockchain platforms.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**										**1**
CO2	**2**	**3**	**3**		**1**							**1**
CO3	**1**	**3**										**1**
CO4	**2**	**3**	**3**		**1**							**1**
CO5	**3**	**3**	**2**		**1**							**1**

****END****

(A462413) EDGE ANALYTICS
(PROFESSIONAL ELECTIVE-IV)

L	T	P	C
3	0	0	3

B. Tech VII Semester

UNIT - I

Introduction to Edge Analytics. What is edge analytics, Applying and comparing architectures, Key benefits of edge analytics, Edge analytics architectures, Using edge analytics in the real world.

UNIT - II

Basic edge analytics components, Connecting a sensor to the ESP-12F microcontroller, KOM-MICS smart factory platform, Communications protocols used in edge analytics, Wi-Fi communication for edge analytics, Bluetooth for edge analytics communication, Cellular technologies for edge analytics communication, Long-distance communication using LoRa and Sign fox for edge analytics.

UNIT - III

Working with Microsoft Azure IoT Hub, Cloud Service providers, Microsoft Azure, Exploring the Azure portal, Azure IoT Hub, Using the Raspberry Pi with Azure IoT edge, connecting our Raspberry Pi edge device, adding a simulated temperature sensor to our edge device.

UNIT - IV

Using Micropython for Edge Analytics, Understanding Micropython, Exploring the hardware that runs MicroPython, Using MicroPython for an edge analytics application, Using edge intelligence with microcontrollers, Azure Machine Learning designer, Azure IoT edge custom vision.

UNIT - V

Designing a Smart Doorbell with Visual Recognition setting up the environment, Writing the edge code, creating the Node-RED dashboard, Types of attacks against our edge analytics applications, Protecting our edge analytics applications.

TEXTBOOK:

1. Hands-On Edge Analytics with Azure IoT: Design and develop IoT applications with edge analytical solutions including Azure IoT Edge by Colin Dow.

REFERENCE BOOKS:

1. Learn Edge Analytics - Fundamentals of Edge Analytics: Automated analytics at source using Microsoft Azure by Ashish Mahajan.

COURSE OUTCOMES:

1. Understand the concepts of Edge Analytics, both in theory and in practical application
2. Demonstrate a comprehensive understanding of different tools used at edge analytics
3. Formulate, Design and Implement the solutions for real world edge analytics.
4. Understanding the concepts in Micropython.
5. Case studies on Dashboard, etc..

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**1**	**1**							**1**
CO2	**3**	**3**	**3**	**1**	**2**							**1**
CO3	**3**	**3**	**3**	**1**	**2**							**1**
CO4	**3**	**3**	**3**	**1**	**1**							**1**
CO5	**3**	**3**	**3**	**1**	**1**							**1**

****END****

(A462414) WEB & DATABASE SECURITY
(PROFESSIONAL ELECTIVE-IV)

L	T	P	C
3	0	0	3

B. Tech: VII Semester

UNIT - I

The Web Security, The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities.

UNIT - V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXTBOOKS:

1. Web Security, Privacy and Commerce Simson GArfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.

REFERENCE BOOKS:

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, O'reilly.
2. Jonathan LeBlanc Tim Messerschmidt, Identity and Data Security for Web Development - Best Practices, O'reilly.
3. McDonald Malcolm, Web Security for Developers, No Starch Press, US.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the Web architecture and applications.
2. Understand client side and server-side programming.
3. Understand how common mistakes can be bypassed and exploit the application.
4. Identify common application vulnerabilities.
5. Understanding the trends in data privacy.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**											**2**
CO2	**1**	**2**	**1**									**2**
CO3	**1**	**2**	**2**	**1**	**3**							**2**
CO4	**1**	**2**	**2**	**1**	**3**							**2**
CO5	**1**	**1**	**1**		**3**							**2**

****END****

(A462415) COMPUTER SECURITY & AUDIT ASSURANCE
(PROFESSIONAL ELECTIVE-IV)

L	T	P	C
3	0	0	3

B. Tech: VII Semester

UNIT - I

System Audit and Assurance – Characteristics of Assurance services, Types of Assurances services, Certified Information system auditor, Benefits of Audits for Organization, COBIT.

UNIT - II

Internal Control and Information system Audit - Internal Control, Detective control, Corrective Control, Computer Assisted Audit Tools and Techniques.

UNIT - III

Conducting Audit – Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing, conducting Audits for Banks.

UNIT - IV

Network Security and Control, Internet Banking Risks and Control, Operating System Risks and Control, Operational Control Overview.

UNIT – V

Business Continuity and Disaster Recovery Planning Control – Data backup/storage, Developing appropriate Disaster recovering strategy, Business Impact analysis.

TEXTBOOK:

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw-Hill Education, 01 Jan 2005.

REFERENCE BOOKS:

1. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, Pearson education
2. Martin Weiss and Michael G. Solomon, Auditing IT Infrastructures For Compliance (Information Systems Security & Assurance), Jones and Bartlett Publishers, Inc.

COURSE OUTCOMES:

On completion of the course students will be able to

1. State the requirements and mechanisms for identification and authentication.
2. Explain and compare the various access control policies and models as well as the assurance of these models.
3. Understand various standard practices and policies in conducting audits.

4. Understand and analyze the significance of Network Security and Control, Internet Banking Risks and Control.
5. Understanding how it affects Business.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		**1**		**2**		**2**						**1**
CO2	**2**	**1**		**2**		**2**						**1**
CO3	**2**	**1**		**2**		**2**						**1**
CO4	**2**	**1**		**2**		**2**						**1**
CO5	**2**	**1**		**2**		**2**					**1**	**1**

****END****

(A462416) SOCIAL MEDIA SECURITY
(PROFESSIONAL ELECTIVE-IV)

B. Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT - I

Introduction to Social Media, Understanding Social Media, Different Types and Classifications, The Value of Social Media, Cutting Edge Versus Bleeding Edge, The Problems That Come with Social Media, Is Security Really an Issue? Taking the Good with the Bad.

UNIT - II

Dark side Cybercrime, Social Engineering, Hacked accounts, cyber stalking, cyber bullying, predators, phishing, hackers.

UNIT – III

Being bold versus being overlooked Good social media campaigns, Bad social media campaigns, sometimes it's better to be overlooked, social media hoaxes, The human factor, Content management, Promotion of social media.

UNIT - IV

Risks of Social media Introduction Public embarrassment, Once it's out there, it's out there False information, Information leakage, Retention and archiving, Loss of data and equipment

UNIT - V

Policies and Privacy Blocking users controlling app privacy, Location awareness, Security Fake accounts passwords, privacy and information sharing**.**

TEXTBOOK:

1. Interdisciplinary Impact Analysis of Privacy in Social Networks, Recognizing Your Digital Friends, Encryption for Peer-to-Peer Social Networks Crowd sourcing and Ethics, Authors: Altshuler Y, EloviciY, Cremers A.B, Aharony N, Pentland A. (Eds.)
2. Social media security https://www.sciencedirect.com/science/article/pii/B97815974998660000

REFERENCE BOOKS:

1. Michael Cross, Social Media Security Leveraging Social Networking While Mitigating Risk.
2. Online Social Networks Security, Brij B. Gupta, Somya Ranjan Sahoo, Principles, Algorithm, Applications, and Perspectives, CRC press.

COURSE OUTCOMES

On completion of the course students will be able to

1. Learn about browser's risks.
2. Learn about Social Networking,
3. Understand the risks while using social media.
4. Understand security of different web browsers.
5. Understand threats and safety measures involved using email communication.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**											**1**
CO2	**2**					**2**						**1**
CO3		**2**		**1**	**1**	**1**						**1**
CO4		**2**		**1**	**1**	**2**						**1**
CO5		**2**		**1**	**1**	**2**		**1**				**1**

****END****

(A462417) DATA ANALYTICS FOR FRAUD DETECTION
(Professional Elective – V)

B.Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Defining Fraud, Anomalies versus Fraud, Types of Fraud, Assess the Risk of Fraud, Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data Analytical Software, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions.

UNIT – II

The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data Statistics and Sampling, Descriptive Statistics, Inferential Statistics.

UNIT – III

Data Analytical Tests: Benford's Law, Number Duplication Test, Z-Score, Relative Size Factor Test, Same-Same-Same Test, Same-Same-Different Test.

UNIT - IV

Advanced Data Analytical Tests Correlation, Trend Analysis, GEL-1 and GEL-2, Skimming and Cash Larceny, Billing schemes: and Data Familiarization, Benford's Law Tests, Relative Size Factor Test, Match Employee Address to Supplier data.

UNIT - V

Payroll Fraud, Expense Reimbursement Schemes, Register disbursement schemes.

TEXTBOOKS:

1. Fraud and Fraud Detection: A Data Analytics Approach by Sunder Gee, Wiley

REFERENCE BOOKS:

1. Blokdyk Gerardus, Data analysis techniques for fraud detection, Create space Independent Publishing Platform
2. Leonard W. Vona, Fraud Data Analytics Methodology: The Fraud Scenario Approach to Uncovering Fraud in Core Business Systems, Wiley.

COURSE OUTCOMES

On completion of the course students will be able to

1. Formulate reasons for using data analysis to detect fraud.

2. Explain characteristics and components of the data and assess its completeness.
3. Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.
4. Automate the detection process.
5. Verify results and understand how to prosecute fraud.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**1**		**1**	**1**						**1**
CO2	**2**	**2**	**1**		**1**	**1**						**1**
CO3	**2**	**3**	**2**		**1**			**1**				**1**
CO4	**2**	**3**	**2**		**1**			**1**				**1**
CO5	**2**	**2**	**1**		**1**	**1**						**1**

****END****

(A462418) 5G TECHNOLOGIES
(Professional Elective – V)

B.Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT – I

Overview of 5G Broadband Wireless Communications: Mobile communications generations: from 1G to 4G, Rationale of 5G - requirements, Standardization activities.

UNIT – II

The 5G wireless Propagation Channels: Channel model requirements, Propagation scenarios and challenges in the 5G modeling, Channel Models for mm Wave, MIMO Systems.

UNIT – III

The 5G radio-access technologies: Access design principles for multi-user communications – Orthogonal Frequency Division Multiplexing (OFDM), Filter Bank Multi-Carriers (FBMC) and Universal Filtered Multi-Carrier (UFMC), Multiple Access Techniques – Orthogonal Frequency Division Multiple Accesses (OFDMA), Non-Orthogonal Multiple Accesses (NOMA).

UNIT – IV

Device-to-Device (D2D) Communications– Extension of 4G D2D standardization to 5G, radio resource management for mobile broadband D2D, multi-hop and multi-operator D2D communications.

UNIT – V

Millimeter-wave Communications – Spectrum and Regulations, Deployment scenarios, Beam-forming, physical layer techniques. Massive MIMO propagation channel models, Pilot design for Massive MIMO, Resource allocation and transceiver algorithms for massive MIMO, Fundamentals of baseband and RF implementations in massive MIMO.

TEXTBOOKS:

1. Afif Osseiran, Jose.F. Monserrat, Patrick Marsch, “Fundamentals of 5G Mobile Networks” Cambridge University Press.

REFERENCE BOOKS:

1. Jonathan Rodriguez, “Fundamentals of 5G Mobile Networks”, John Wiley & Sons.
2. Amitabha Ghosh and Rapeepat Ratasuk “Essentials of LTE and LTE-A”, Cambridge University Press
3. Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, “New Directions in Wireless Communication Systems from Mobile to 5G”, CRC Press.
4. Theodore S. Rappaport, Robert W. Heath, Robert C. Danials, James N. Murdock “Millimeter
5. Wave Wireless Communications”, Prentice Hall Communications.

6. Martin Sauter “From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband”, Wiley-Blackwell.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand 5G and 5G Broadband Wireless Communications
2. Understand 5G wireless Propagation Channels
3. Understand the significance of radio access technologies for 5G
4. Analyze Device-to-device (D2D) communications.
5. Learn Massive MIMO propagation channel models.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**				**1**							**1**
CO2	**3**				**1**	**2**	**2**					**1**
CO3	**3**		**1**			**1**	**1**					**1**
CO4	**3**	**1**			**1**	**1**						**1**
CO5	**3**		**2**		**1**	**1**						**1**

****END****

(A462419) SECURITY INCIDENT AND RESPONSE MANAGEMENT
(Professional Elective – V)

B.Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT- I

Introduction: Preparing for the inevitable incident: Real-world incident, IR management incident handbook, Pre-incident preparation, preparing the Organization for Incident Response, Preparing the IR team, preparing the Infrastructure for Incident Response. Incident Detection and **Characterization:** Getting the investigation started on the right foot, collecting initial facts, Maintenance of Case Notes, Understanding Investigative Priorities. Discovering the scope of **Incident:** Examining initial data, Gathering and reviewing preliminary evidence, determining a course of action, Customer data loss scenario, automated clearing fraud scenario.

UNIT- II

Data Collection: Live Data Collection: When to perform live response, selecting a live response tool, what to collect, collection best practices, Live data collection on Microsoft Windows Systems, Live Data Collection on Unix-based Systems. Forensic Duplication: Forensic Image Formats, Traditional duplication, live system duplication, Duplication of Enterprise Assets.

UNIT- III

Network Evidence: The case for network monitoring, Types for network monitoring, setting up a Network Monitoring System, Network Data, Analysis, Collect Logs Generated from Network Events. Enterprise Services: Network Infrastructure Services, Enterprise Management Applications, Web servers, Database Servers.

UNIT- IV

Data Analysis: Analysis Methodology: Define Objectives Know your data, Access your data, Analyze your data, Evaluate Results. Investigating Windows Systems: NTFS and File System analysis, prefetch, Event logs, Scheduled Tasks, The Windows Registry, Other Artifacts of Interactive Sessions, Memory Forensics, Alternative Persistence Mechanisms.

UNIT- V

Investigating Mac OS X Systems: HFS and File System Analysis, Core Operating Systems data. Investigating Applications: What is Application Data? Where is the application? data stored? General Investigation methods, Web Browser, Email Clients, Instant Message Clients.

TEXTBOOK:

1. "Incident Response and Computer Forensics", Jason T. Luttgens, Mathew Pepe and Kevin Mandia, 3rd Edition, Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. "Cyber Security Incident Response-How to Contain, Eradicate, and Recover from Incidents", Eric. C. Thompson, A press.
2. "The Computer Incident Response Planning Handbook: Executable Plans for Protecting Information at Risk", N.K. McCarthy, Tata McGraw-Hill.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Learn how to handle the incident response management.
2. Perform live data collection and forensic duplication.
3. Identify network evidence.
4. Analyze data to carry out an investigation.
5. Knowledge on investigation on Mac and Windows OS systems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**		**1**							**1**
CO2	**3**	**2**	**1**		**1**	**2**						**1**
CO3	**3**	**2**	**1**		**1**	**2**						**1**
CO4	**3**	**2**	**1**		**1**	**2**		**1**				**1**
CO5	**3**	**2**			**1**	**1**						**1**

****END****

(A462420) AUTHENTICATION TECHNIQUES
(Professional Elective – V)

B.Tech: VII Semester

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Authentication: Protocol Architectures, Cryptographic tools, Adversary capabilities, Goals for authentication and key establishment, Tools for verification of Protocols Authentication Tokens: Tokens, Network Password Sniffing, One-Time Passwords, Man in the middle Attack, IP Hijacking, Incorporating a PIN, Enrolling Users.

UNIT- II

Authentication and Key Transport Using Public Key Cryptography: Entity Authentication Protocols: Protocols in ISO/IEC 9798-3, Protocols in ISO/IEC 9798-5, SPLICE/AS, Key Transport Protocols. Key Agreement Protocols: Introduction, Diffie-Hellman Key Agreement, MTI Protocols, Diffie-Hellman based protocols with Basic Message Format, Diffie-Hellman based protocols with explicit authentication.

UNIT- III

Biometrics: Biometrics, Uses of Biometrics, Biometric Techniques, How Biometrics Work, taking a Biometric Reading, Feedback During Biometric Input, forging a Physical Trait, Building and Matching Patterns, A Trivial Hand Geometry Biometric, Enrolling a User, Biometric Accuracy, Biometric Encryption, Authenticity of Biometric Data, The Problem of Biometric Exploitation.

UNIT- IV

Local Authentication: Laptops and Workstations, Workstation Encryption, File Encryption, Volume Encryption, Encryption for Data Protection, Shortcut Attacks on Encryption, Trial-and-Error Attacks on Encryption, Theoretical Guess-Rate Limitations, Key-Handling Issues, Key-Handling Policies, Key Escrow and Crypto Politics Authentication by Address: Telephone Numbers as Addresses, Identification via Dial-Back, Dial-Up Identification: Caller ID, Network Addresses, Denial of Service Attacks, Effective Source Authentication, Unix Local Network Authentication, Remote Procedure Calls, NFS, and NIS, Authenticating a Geographical Location.

UNIT- V

Indirect Authentication: Indirect Authentication, Network Boundary Control, One-Time Password Products, LAN Resource Control, RADIUS Protocol, Protecting RADIUS Messages, RADIUS Challenge Response, Encrypted Connections and Windows NT, Encrypted Connections, Integrity Protection, Politics, Encryption, and Technical Choices, Windows NT Secure Channels, Secure Channel Keying, Attacks on Secure Channels, Computers' Authentication Secrets.

TEXTBOOKS:

1. "Protocols for Authentication and Key Establishment", Colin Boyd and Anish Mathuria, springer, 2022.
2. "Authentication: From Passwords to Public Keys", Smith, R. E. (2002), United Kingdom: Addison-Wesley.

REFERENCE BOOKS:

1. Biometrics Authentication: A Practical Guide to Fingerprint, Face, Iris, and Speech Recognition by Anil Jain, Arun Ross, and Karthik Nandakumar
2. Kerberos: The Protocol and Its Applications by William Stallings
3. Biometrics Technologies and verification Systems, John Vacca, , Elsevier Inc. , 2007.
4. Pattern Classification, Richard O. Duda, David G.Stork, Peter E. Hart, Wiley 2007.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand different types of authentication techniques
2. Understand authentication and Key Transport using Key Cryptography
3. Understand different biometric techniques used in authentication.
4. Understand the procedure of local authentication and Authentication by Addresses.
5. Apply various authentication protocols in different environments and their representation.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**		**1**							**1**
CO2	**3**	**2**	**1**		**1**	**2**						**1**
CO3	**3**	**2**	**1**		**1**	**2**						**1**
CO4	**3**	**2**	**1**		**1**	**2**		**1**				**1**
CO5	**3**	**2**			**1**	**1**						**1**

****END****

(A462421) IOT CLOUD PROCESSING AND ANALYTICS
(Professional Elective – VI)

B.Tech: VIII Semester

L	T	P	C
3	0	0	3

UNIT – I

Introducing IoT Analytics IoT Data and BigData, Challenges of IoT Analytics, Applications, IoT Analytics Lifecycle and Techniques IoT Cloud and Big Data Integration for IoT Analytic, Introduction, IaaS, PaaS and SaaS Paradigms, Requirements of IoT Big Data Analytics, Platform 3, Functional Architecture, Data Analytics for the IoT, Data Collection Using Low-power, Long-range Radios, WAZIUP Software Platform, iKaaS Software Platform

UNIT - II

Searching the Internet of Things Introduction, A Search Architecture for Social and Physical Sensors, Local Event Retrieval, Using Sensor Metadata Streams to Identify Topics of Local, Events in the City, Venue Recommendation

UNIT - III

Development Tools for IoT Analytics Applications Introduction, Related Work, The VITAL Architecture for IoT Analytics Applications, VITAL Development Environment, Development Examples.

UNIT - IV

An Open-Source Framework for IoT Analytics as a Service Introduction, Architecture for IoT Analytics- as-a-Service, Sensing-as-a-Service Infrastructure Anatomy, Scheduling, Metering and Service Delivery, Sensing-as-a-Service Example, From Sensing as-a-Service to IoT-Analytics- as-a-Service.

UNIT - V

A Review of Tools for IoT Semantics and Data Streaming Analytics, Introduction, Related Work, Semantic Analysis, Tools and Platforms Data Analytics for Smart Cities Introduction, Cloud-based IoT Analytics, Cloud-based City Platform, Solutions, Edge, State of the Art, Edge-based City Platform, Workflow, Task and Topology, IoT-friendly Interfaces, Use Case of Edge based Data Analytics

TEXTBOOKS:

1. Building Blocks for IoT Analytics by John Soldatos, River Publisher

REFERENCE BOOKS:

1. Analytics for the Internet of Things (IoT)by Andrew miller, Packt Publishing.
2. Big Data Analytics for Internet of Things by Tausifa Jan Saleem, Mohammad Ahsan Chishti,

COURSE OUTCOMES

On completion of the course students will be able to

1. Learn IoT Big data challenges.
2. Integrate Cloud and Big Data for IOT analytics.
3. Analyse sensor data streams for events.
4. Know open-source framework for IoT analytics.
5. Review tools for semantic and data stream analytics.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**1**	**1**							**1**
CO2	**3**	**3**	**3**	**1**	**2**							**1**
CO3	**3**	**3**	**3**	**1**	**2**							**1**
CO4	**3**	**3**	**3**	**1**	**1**							**1**
CO5	**3**	**3**	**3**	**1**	**1**							**1**

****END****

(A462422) CLOUD SECURITY
(Professional Elective – VI)

B.Tech :VIII Semester

L	T	P	C
3	0	0	3

UNIT – I

Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models, Cloud Deployment Models, Cloud Service Platforms, Challenges Ahead.

Introduction to Cloud Security: Introduction, Cloud Security Concepts, CSA Cloud Reference Model, NIST Cloud Reference Model, NIST Cloud Reference Model.

UNIT - II

Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud. Infrastructure **Security:** The Network Level, the Host Level, The Application Level, SaaS Application Security, PaaS Application Security, IaaS Application Security.

UNIT – III

Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios, A Taxonomy of Attacks. Attack Tools: Network-level attack tools, VM-level attack tools, VMM attack tools, Security Tools, VMM.

security tools.

UNIT – IV

Information Security Basic Concepts: an Example of a Security Attack, Cloud Software Security Requirements, Rising Security Threats.

Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provide, Data and Its Security.

UNIT - V

Evolution of Security Considerations: Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for Security, Issues with Cloud Computing, Side Channel Security Attacks in the Cloud. **Security Management in the Cloud:** Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management.

TEXTBOOKS:

1. Cloud Security Attacks, Techniques, Tools, and Challenges by Preeti Mishra, Emmanuel S Pilli, Jaipur R C Joshi Graphic Era, 1st Edition published 2022 by CRC press.
2. Cloud Security and Privacy by Tim Mather, Subra Kumaraswamy, and Shahed Lati First Edition, September 2019.

3. Cloud Computing with Security and Scalability, Concepts and Practices by Naresh Kumar Sehgal, Pramod Chandra P. Bhatt, John M. Acken · Springer International Publishing 2022.

REFERENCE BOOKS:

1. Essentials of Cloud Computing by K. Chandrasekaran Special Indian Edition CRC press.
2. Cloud Computing Principles and Paradigms by Rajkumar Buyya, John Wiley.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Acquire the knowledge on fundamentals concepts of cloud computing.
2. Distinguish the various cloud security and privacy issues.
3. Analyze the various threats and Attack tools
4. Understand the Data Security and Storage concepts.
5. Understand the concepts in cloud security.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										**1**
CO2	**3**	**3**	**3**		**1**							**1**
CO3	**3**	**3**	**3**		**1**							**1**
CO4	**3**	**2**	**2**		**2**		**1**					**1**
CO5	**3**	**2**	**3**		**2**		**1**					**1**

****END****

(A462423) DIGITAL WATERMARKING AND STEGANOGRAPHY
(Professional Elective – VI)

L	T	P	C
3	0	0	3

B.Tech: VIII Sem

UNIT – I

Introduction: Information Hiding, Steganography and Watermarking, History of watermarking, Importance of digital watermarking, Applications and Properties, Evaluating watermarking systems. Watermarking models & message coding, Notation, Communications, Communication-based models, Geometric models, Mapping messages into message vectors, Error correction coding, Detecting Mult symbol watermarks**.**

UNIT - II

Watermarking with side information & analyzing errors: Informed Embedding, Informed Coding – Structured dirty-paper codes, Message errors, False positive errors, False negative errors, ROC curves– Effect of whitening on error rates.

UNIT - III

Perceptual models: Evaluating perceptual impact, General form of a perceptual model, Examples of perceptual models, Robust watermarking approaches, Redundant Embedding, Spread Spectrum Coding, Embedding in Perceptually significant coefficients.

UNIT – IV

Watermark security & authentication: Security requirements, Watermark security and cryptography, Attacks, Exact authentication, Selective authentication, Localization, Restoration.

UNIT - V

Steganography: Steganography communication, Notation and terminology, Information, theoretic foundations of steganography, Practical steganographic methods, Minimizing the embedding impact, Steganalysis.

TEXTBOOKS:

1. Digital Watermarking and Steganography, Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, Morgan Kaufmann Publishers, New York, 2008.

REFERENCE BOOKS:

1. Techniques and Applications of Digital Watermarking and Contest Protection, Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.
2. Digital Watermarking for Digital Media, Juergen Seits, IDEA Group Publisher, New York, 2005.

3. Disappearing Cryptography – Information Hiding: Steganography & Watermarking, Peter Wayner, Morgan Kaufmann Publishers, New York, 2002

COURSE OUTCOMES:

On completion of the course students will be able to

1. Know the History and importance of watermarking and steganography.
2. Analyze Applications and properties of watermarking and steganography.
3. Demonstrate Models and algorithms of watermarking.
4. Possess the passion for acquiring knowledge and skill in preserving authentication of Information.
5. Identifying the theoretic foundations of steganography and steganalysis.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										**1**
CO2	**3**	**2**	**1**									**1**
CO3	**3**	**2**	**3**		**1**							**1**
CO4	**3**	**2**	**2**									**1**
CO5	**3**	**2**	**2**									**1**

****END****

(A462424) MOBILE APPLICATION SECURITY
(PROFESSIONAL ELECTIVE-VI)

L	T	P	C
3	0	0	3

B. Tech: VII Semester

UNIT - I

Top Mobile Issues and Development Strategies: Top Issues Facing Mobile Devices, Physical Security , Secure Data Storage (on Disk), Strong Authentication with Poor Keyboards , Multiple-User Support with Security, Safe Browsing Environment, Secure Operating Systems, Application Isolation, Information Disclosure, Virus, Worms, Trojans, Spyware, and Malware, Difficult Patching/Update Process, Strict Use and Enforcement of SSL, Phishing , Cross-Site Request Forgery (CSRF), Location Privacy/Security, Insecure Device Drivers, Multi Factor Authentication, Tips for Secure Mobile Application Development.

UNIT - II

WAP and Mobile HTML Security WAP and Mobile HTML Basics, Authentication on WAP/Mobile HTML Sites, Encryption, Application Attacks on Mobile HTML Sites, Cross-Site Scripting, SQL Injection, Cross-Site Request Forgery, HTTP Redirect, Phishing, Session Fixation, Non-SSL Login, WAP and Mobile Browser Weaknesses, Lack of HTTP Only Flag Support, Lack of SECURE Flag Support, Handling Browser Cache, WAP Limitations.

UNIT - III

Bluetooth Security Overview of the Technology, History and Standards, Common Uses, Alternatives, Future, Bluetooth Technical Architecture , Radio Operation and Frequency, Bluetooth Network Topology , Device Identification, Modes of Operation , Bluetooth Stack, Bluetooth Profiles, Bluetooth Security Features , Pairing , Traditional Security Services in Bluetooth, Security "Non-Features", Threats to Bluetooth Devices and Networks, Bluetooth Vulnerabilities, Bluetooth Versions Prior to v1.2, Bluetooth Versions Prior to v2.1. Security for 1g Wi-Fi Applications, Security for 2g Wi-Fi Applications, Recent Security Schemes for Wi-Fi Applications.

UNIT - IV

SMS Security Overview of Short Message Service, Overview of Multimedia Messaging Service, Wireless Application Protocol (WAP), Protocol Attacks, Abusing Legitimate Functionality, Attacking Protocol Implementations, Application Attacks, iPhone Safari, Windows Mobile MMS, Motorola RAZR JPG Overflow, Walkthroughs, Sending PDUs, Converting XML to WBXML.

UNIT – V

Enterprise Security on the Mobile OS Device Security Options, PIN, Remote, 346 Secure Local Storage, Apple iPhone and Keychain, Security Policy Enforcement, Encryption, Full Disk Encryption, E-mail Encryption, File Encryption, Application Sandboxing, Signing, and

Permissions, Application Sandboxing, Application Signing, Permissions, Buffer Overflow Protection, Windows Mobile, iPhone, Android, BlackBerry, Security Feature Summary.

TEXTBOOKS:

1. Mobile Application Security, Himanshu Dwivedi, Chris Clark, David Thiel, TATA McGraw Hill.

REFERENCE BOOKS:

1. Mobile and Wireless Network Security and Privacy, Kami S. Makki, et al, Springer.
2. Android Security Attacks Defenses, Abhishek Dubey, CRC Press.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand common mobile application security vulnerabilities.
2. Define the security controls of multiple mobile operating systems.
3. Understand and analyze Bluetooth technology.
4. Understand and analyze overview of SMS security and Enterprise security.
5. Understanding the mobile security in Android, Blackberry.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										1
CO2	3	3	3		1							1
CO3	3	3	3		1							1
CO4	3	2	2		2		1					1
CO5	3	2	3		2		1					1

****END****

(A404601) FUNDAMENTALS OF INTERNET OF THINGS
(Open Elective-I)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Arduino: Introduction to Arduino Uno, Features, Pin functionality, Basic Arduino Programming: Interfacing LEDs, Switches using Digital I/O Read/Write, Acquiring and generating signals using Analog I/O Read/Write, Serial functions.

UNIT – II

Introduction to Raspberry Pi: Introduction to Raspberry Pi, Pin functionality, Revision of Python Programming; Raspberry Pi commands, GPIO programming.
Other Open-Source Devices: Features and pin functions of Node MCU, ESP8266, ESP32.

UNIT - III

Introduction to IOT: Terms and definitions, Logical design of IoT, IOT Reference Model.
IOT and M2M: Introduction to M2M, Difference between IoT and M2M and other types.
IOT Servers and Cloud Offerings: IoT enabling technologies – Cloud Computing; Introduction to Cloud Storage/Services – Google, Microsoft Azure, IBM, Amazon Web services for IOT, setting up to read and write using Thing speak.

UNIT – IV

IOT & Communication Protocols: Serial –RS 485, IEEE1394 Firewire, I2C, SPI, USB, CAN; Wireless sensor networks and its technologies, IOT Protocols.

UNIT – V

Domain Specific IOT Applications & Case Studies:
IOT Application & case studies for Agriculture, Smart Cities & Transport, Home Automation, Environment, Retail, Logistics, Health, Lifestyle, Industry – Energy.

TEXTBOOKS:

1.Srinivasa K G, Siddesh G M, Hanumantha Raju R, Internet of Things, Cengage, 2019.

REFERENCE BOOKS:

1.Arshdeep Bahga, Vijay Madisetti, “Internet of Things: A Hands-on-Approach”, VPT, 1stEdition, 2014
2.Jeremy Blum, Exploring Arduino: Tools and Techniques for Engineering Wizardry, Wiley, 2013.
3.Simon Monk, Raspberry Pi Cookbook, O'Reilly 3rd Edition, 2019
4.Michael Margolis, Arduino Cookbook, 2nd Edition, December 2011, O'Reilly Media, Inc.

5.Rahul Dubey, An Introduction to Internet of Things – Connecting Devices, Edge Gateway, and Cloud with Applications, Cengage, 2019.

COURSE OUTCOMES:

Students will be able to

1. Have knowledge of programming open-source Edge devices like Arduino, Raspberry Pi.
2. Apply the knowledge of Arduino and raspberry pi with clouds for IOT applications.
3. Analyze the different communication and IOT protocols.
4. Aware of various cloud services and providers.
5. Understand various IOT implementations in different domains.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**				**2**	**2**	**2**	**2**			
CO2	**3**	**2**	**3**			**2**	**2**			**3**		**2**
CO3		**3**	**3**	**2**	**3**	**3**	**2**		**3**			
CO4				**2**	**3**	**3**					**3**	
CO5					**3**		**2**	**2**	**3**		**3**	**2**

****END****

(A404602) PRINCIPLES OF DIGITAL SIGNAL PROCESSING
(Open Elective-I)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT-I

Introduction to Signal and Systems: Basic Signals and Systems – properties and basic operations-1-D Signals and Filters – Random Signals - Multi- dimensional Signals – Analog and Digital signals and their conversion techniques Convolution process, Filtering process, Z-transform concepts.

UNIT-II

Time domain analysis and Characteristics

Correlation and Discrete sequences: notation, signal characteristics, and operations Discrete linear time invariant systems -Properties and analysis of discrete linear time invariant systems Periodic sampling: aliasing and lowpass filtering.

UNIT-III

Frequency domain Analysis

Discrete Fourier transforms (DFT) DFT properties: symmetry, linearity, magnitudes, frequency axis, and shifting Inverse DFT- Fast Fourier transform (FFT): relationship to DFT, implementation considerations, radix-2 algorithm, and input/output indexing FFT: butterfly algorithm structures.

UNIT-IV

FIR filter design

FIR filters–Introduction-Basic Properties-Design using Hamming, Hanning Windows-Realization of FIR filters.

UNIT-V

IIR filter design

Review of design of analogue Butterworth Filters, - Design of IIR digital filters using impulse invariance technique- Realization using direct, cascade and parallel forms.

TEXTBOOKS:

1. Richard G. Lyons, Understanding Digital Signal Processing, Third edition, Prentice-Hall, 2011.2. Introduction to Digital Signal Processing, Paprocki's &E. Manolakis, MacMillan, 2007 (4thEdition)

REFERENCES:

1. S. Salivahanan, A. Vallavaraj, C.Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International,2007
2. E.C. Ifeachor and B. W.Jervis,"Digital signal processing-A practical approach", Second edition,Pearson,2002.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Characterize discrete time signals and LTI signal processing systems mathematically.
2. Analyze the functions performed by simple discrete-time systems.
3. Develop the discrete Fourier transform (DFT) over time domain signals, its applications and its implementation by FFT techniques.
4. Apply the design techniques for FIR type digital filters known as the windowing method.
5. Design IIR type digital filters over the given specifications.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										**1**
CO2	**3**	**3**										**1**
CO3	**3**	**3**	**2**									**1**
CO4	**3**	**3**	**2**	**2**								**1**
CO5	**3**	**3**	**2**	**2**								**1**

****END****

(A402601) RENEWABLE ENERGY SOURCES
(Open Elective-I)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT I: GLOBAL AND NATIONAL ENERGY SCENARIO

Over view of conventional & renewable energy sources, need & development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Global and Indian Energy scenario, Renewable and Non-renewable Energy sources, Energy for sustainable development, Potential of renewable energy sources, renewable electricity and key elements, Global climate change, CO2 reduction potential of renewable energy- concept of Hybrid systems.

UNIT II: SOLAR ENERGY

Solar energy system, Solar Radiation, Availability, Measurement and Estimation, Solar Thermal Conversion Devices and Storage, Applications Solar Photovoltaic Conversion solar photovoltaic, solar thermal, applications of solar energy systems.

UNIT III: WIND ENERGY

Wind Energy Conversion, Potential, Wind energy potential measurement, Site selection, Types of wind turbines, Wind farms, wind Generation and Control. Nature of the wind, power in the wind, factors influencing wind, wind data and energy estimation, wind speed monitoring, classification of wind, characteristics, applications of wind turbines, offshore wind energy – Hybrid systems, wind resource assessment, Betz limit, site selection, wind energy conversion devices. Wind mill component design, economics and demand side management, energy wheeling, and energy banking concepts. Safety and environmental aspects, wind energy potential and installation in India.

UNIT IV: BIO GAS

Properties of biogas (Calorific value and composition), biogas plant technology and status, Bio energy system, design and constructional features. Biomass resources and their classification, Biomass conversion processes, Thermo chemical conversion, direct combustion, biomass gasification, pyrolysis and liquefaction, biochemical conversion, anaerobic digestion, types of biogas Plants, applications, alcohol production from biomass, bio diesel production, Urban waste to energy conversion, Biomass energy programme in India.

UNIT V: OCEAN ENERGY

Ocean wave energy conversion, principle of Ocean Thermal Energy Conversion (OTEC), ocean thermal power plants, tidal energy conversion, Tidal and wave energy its scope and development, Scheme of development of tidal energy.

Small hydro Power Plant: Importance of small hydro power plants and their Elements, types of turbines for small hydro, estimation of primary and secondary power.

Geothermal Energy: Geothermal power plants, various types, hot springs and steam ejection.

TEXTBOOKS

1. Renewable Energy Sources / Twidell, J.W. and Weir, A./ EFN Spon Ltd., 1986.
2. Non-Conventional Energy Sources / G.D Rai/ Khanna Publishers

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the importance of renewable energy sources.
2. Explain the operation of solar energy system.
3. Illustrate various wind energy conversion systems.
4. Explain the operation Bio gas conversion
5. Explain the principle and operation of Ocean wave energy conversion.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**1**	**1**			**1**			**2**		
CO2	**2**	**1**	**1**	**1**			**1**			**2**		
CO3	**2**	**1**	**1**	**1**			**1**			**2**		
CO4	**2**	**1**	**1**	**1**			**1**			**2**		
CO5	**2**	**1**	**1**	**1**			**1**			**2**		

****END****

(A402602) BASICS OF POWER ELECTRONICS & DRIVES
(Open Elective-I)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

UNIT I: POWER SEMICONDUCTOR DEVICES

Power Semiconductor Devices Construction and Characteristics of Power diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar transistors (IGBTs) Introduction to Thyristor family: SCR, DIACs, TRIACs.

UNIT II: PHASE CONTROLLED (AC TO DC) CONVERTERS

Principle of phase-controlled converter operation; Operation of 1-phase half wave converter with R, RL and RLE load; 1- phase full wave converter, Bridge Configuration; Operation with R, RL, RLE load; Operation of 1-phase Semi-converter/ Half controlled converter:

UNIT III: THREE -PHASE CONVERTERS

Operation of half wave converter: Full wave fully controlled converters: Semi-controlled converter; Dual Converter: Principle and operation; Applications of AC-DC converters

UNIT IV: DC TO DC CONVERTERS

The chopper, Basic principle of DC chopper, Classification of DC choppers, Control strategies Basic DC-DC converter (switch regulator) topologies: Principle, operation Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation, Two zone operation, Four quadrant operation (Operating modes),

UNIT V: POWER CONVERTERS FED DRIVES

Single phase separately excited drives: Half Wave converter, Semiconverter and Fully Controlled converter based drives; Braking operation of separately excited drive Semi-converter and Fully Controlled converter based drives 3-phase separately excited drives: Half Wave converter, Semi-converter and Fully Controlled converter based drives; Principle of power control (motoring control) of separately excited and series motor with DC-DC Converter;

TEXT BOOKS:

1. M D Singh and K B Khanchandani, “Power electronics”, TMH, New Delhi, 2nd ed., 2007.
2. P.S. Bimbhra, “Power Electronics”, Khanna Publishers, New Delhi, 2012..
3. Muhammad H. Rashid, “Power Electronics - Circuits, Devices and Applications”, Prentice Hall of India, 3rd ed., 2003.

REFERENCE BOOKS:

1. Vedam Subramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore, 2nd ed. 2006.
2. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc., 3rd ed., 2003.
3. V.R.Moorthi, "Power Electronics", Oxford University press, 2005.
4. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyristorised Power Controllers", New Age International Ltd. Publishers, 1986 (Reprint 2008).
5. P.T. Krein, "Elements of Power Electronics", Oxford University Press, 1998.
6. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2nd ed. 2001

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain the construction and characteristics of Power semiconductor devices.
2. Analyze the operation of single phase and three phase ac-to-dc converters.
3. Analyze various three phase converters.
4. Compare the various types of dc-to-dc converters.
5. Apply the knowledge of power electronic converter for various applications.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**							**2**		
CO2	**3**	**3**	**3**	**1**						**2**		
CO3	**3**	**3**	**3**	**1**						**2**		
CO4	**3**	**3**	**1**	**1**						**2**		
CO5	**3**	**3**	**1**	**2**						**2**		

****END****

(A405604) JAVA PROGRAMMING
(Open Elective-I)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT-I

Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Type Conversion, Casting, Conditional Statements, Loops, Branching Mechanism, Classes,Objects, Class Declaration, Creating Objects, Method Declaration and Invocation, Method Overloading, Constructors– Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects, Class Variables & Methods-static Keyword, this Keyword.

UNIT–II

Arrays: One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Class. **Inheritance:** Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keywords, Abstract classes, Interfaces, Abstract Classes Verses Interfaces.

UNIT–III

Packages–Creating and Using Packages, Access Protection, Wrapper Classes, String Class, String Buffer Class. Exception: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

UNIT-IV

Multithreading: Introduction, Main Thread, Creation of New Threads – By Inheriting the Thread Class or Implementing the Runnable Interface, Thread Lifecycle, Thread Priority, Synchronization.

UNIT–V

java.io Package, File Class, FileInputStream Class, FileOutputStream Class, Scanner Class, BufferedInputStream Class, BufferedOutputStream Class, RandomAccessFile Class.

TEXT BOOKS:

1. Sachin Malhotra, Saurabh Choudhary, Programming in Java (2e), Oxford publications.

REFERENCE BOOKS:

1. Herbert Schildt, Java: The Complete Reference (9e), McGraw Hill Education;
2. Thomas Wu, An introduction to object-oriented programming with Java (5e), McGraw-Hill Education;

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the OOPs concepts.
2. Describe various types of Inheritance in Java.
3. Develop robust Java applications using Packages, Exceptions.
4. Implement Java applications using Java Threads.
5. Design Java applications with various modes of Input and output

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**2**		**1**							**1**
CO2	**2**	**1**	**1**		**1**							**1**
CO3	**3**	**2**	**2**		**1**							**1**
CO4	**2**	**1**	**1**		**1**							**1**
CO5	**1**											**1**

****END****

(A405602) FUNDAMENTALS OF OPERATING SYSTEMS
(Open Elective-I)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads.

UNIT - II

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec.

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

UNIT - III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT – IV

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT – V

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

TEXTBOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Will be able to control access to a computer and the files that may be shared
2. Demonstrate the knowledge of the components of computers and their respective roles in computing.
3. Ability to recognize and resolve user problems with standard operating environments.
4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.
5. Understanding the concepts in memory management.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**							**2**		
CO2	**3**	**3**	**3**	**1**						**2**		
CO3	**3**	**3**	**3**	**1**						**2**		
CO4	**3**	**3**	**1**	**1**						**2**		
CO5	**3**	**3**	**1**	**2**						**2**		

****END****

(A403601) FUNDAMENTALS OF ENGINEERING MATERIALS
(Open Elective-I)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT – I

Structure of Metals: Crystallography, Miller's indices, Packing Efficiency, Density calculations. Grains and Grain Boundaries. Effect of grain size on the properties. Determinvation of grain size by different methods. Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

UNIT –II

Phase Diagrams: Construction and interpretation of phase diagrams, Phase rule. Lever rule. Binary phase Diagrams, Isomorphous, Eutectic and Eutectoid transformations with examples.

UNIT – III

Steels: Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe3C phase diagram. Construction of TTT diagrams. Annealing, Normalizing, Hardening and Tempering of steels, Hardenability. Alloy steels.

UNIT – IV

Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron. Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Al-Cu phase diagram, Titanium, and its alloys.

UNIT – V

Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties, and applications. Classification, properties and applications of composites. Classification, Properties, and applications of Polymers.

TEXTBOOKS:

1. Material Science and Metallurgy/ Kodgire
2. Essentials of Materials Science and engineering / Donald R. Askeland / Thomson.

REFERENCE BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avner.
2. Materials Science and engineering / William and callister.
3. Elements of Material science / V. Rahghavan

COURSE OUTCOMES:

On completion of the course students will be able to

1. Identify the crystalline structure of steel.
2. Understand the theory of time temperature and transformation
3. Determine of different uses of heat treatment in steel.
4. Distinguish between the various forms of steel.
5. Understand the properties of non-ferrous alloys and uses of composite materials.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**2**	**1**	**2**		**2**			**2**
CO2	**3**	**3**	**2**	**3**	**3**	**1**	**2**		**2**			**2**
CO3	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO4	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO5	**3**	**3**	**1**	**3**	**2**	**1**	**2**		**1**			**2**

****END****

(A403602) BASICS OF THERMODYNAMICS
(Open Elective-I)

B. Tech:CSE(CS)

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle, Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility.

UNIT - II

Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale.

UNIT – III

First and Second Laws of Thermodynamics: First Law: Cycle and Process, Specific Heats (cpand cv), Heat interactions in a Closed System for various processes, Limitations of First Law,Concept of Heat Engine (H.E.) and Reversed H.E. (Heat Pump and Refrigerator), Efficiency/COP, Second Law: Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT - IV

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const.

Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation, Psychrometric chart.

UNIT - V

Power Cycles: Otto, Diesel cycles - Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis

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

TEXT BOOKS:

1. Basic Engineering Thermodynamics / PK Nag / Mc Graw Hill
2. Engineering Thermodynamics / chattopadhyay/ Oxford

REFERENCE BOOKS:

1. Thermodynamics for Engineers / Kenneth A. Kroos, Merle C. Potter/ Cengage
2. Thermodynamics /G.C. Gupta /Pearson

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2. Evaluate changes in thermometric properties of substances.
3. Apply the laws of thermodynamics to different systems.
4. Understand the psychrometric properties of air
5. Compare different air standard cycles.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**2**	**1**	**2**		**2**			**2**
CO2	**3**	**3**	**2**	**3**	**3**	**1**	**2**		**2**			**2**
CO3	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO4	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO5	**3**	**3**	**1**	**3**	**2**	**1**	**2**		**1**			**2**

****END****

(A400601) – BASICS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT
(Open Elective-I)

B. Tech: CSE (CS)

L	T	P	C
3	0	0	3

Unit – I:

Understanding Supply Chain: Objectives of a Supply Chain, Importance, Stages of Supply Chain, Value Chain Process, Cycle View of Supply Chain Process, Key Issues in SCM, Logistics & SCM, Supply Chain Drivers and Obstacles, Supply Chain Strategies, Strategic Fit, Best Practices in SCM, Obstacles of Streamlined SCM, Green Supply Chain Management, Supply Chain Sustainability.

Unit – II:

Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Difference between Logistics and Supply Chain, Distribution related Issues and Challenges. Gaining Competitive Advantage through Logistics Management, Transportation: Functions, Costs, and Mode of Transportation Network and Decision, Models, Containerization, Cross Docking, Reverse Logistics. **Outsourcing:** Nature and Concept, Strategic Decision to Outsourcing, Third-party Logistics (3PL), Fourth-party Logistics (4PL).

Unit – III:

Designing the Supply Chain Network: Designing the Distribution Network, Role of Distribution, Factors Influencing Distribution, Design Options, e-Business and its Impact, Distribution Networks in Practice, Network Design in the Supply Chain, Role of Network, Factors Affecting the Network Design Decisions, Modelling for Supply Chain.

Unit – IV:

Supply Chain Performance: Bullwhip Effect and Reduction, Performance Measurement: Dimension, Tools of Performance Measurement, SCOR Model. Demand Chain Management, Global Supply Chain, Challenges in Establishing Global Supply Chain, Factors that influence Designing Global Supply Chain Network.

Unit – V:

Coordination in a Supply Chain: Importance of Coordination, Lack of Supply Chain Coordination and the Bullwhip Effect, Obstacles to Coordination, Managerial Levels, Building Partnerships and Trust, Continuous Replenishment and Vendor Managed Inventories, Collaborative Planning, Forecasting and Replenishment. Role of Information Technology in Supply Chain, Supply Chain 4.0.

REFERENCE BOOKS

1. IMT Ghaziabad, Advanced Supply Chain Management, Sage Publications, 2021.
2. Rajat K. Basiya, Integrated Supply Chain Management, Sage Publications, 2020.
3. K Sridhara Bhat, Logistics & Supply Chain Management, HPH,1e,2017.
4. Chopra, Sunil, Meindl, Peter and Kalra, D. V., Supply Chain Management: Strategy, Planning and Operation; Pearson Education, 6e, 2016.
5. Altekar, Rahul V, Supply Chain Management: Concepts and Cases; PHI Learning ,1e,2005.
6. Donald J. Bowersox and David J. Closs, Logistical Management" The Integrated Supply Chain Process, TMH, 2017
7. Edward J Bradi, John J Coyle, A Logistics Approach to Supply Chain Management, Cengage Learning, New Delhi, 2012
8. Sunil Chopra and Peter Meindl, Supply chain Management: Strategy, Planning and Operation, Pearson Education, New Delhi 2013

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the cyclical perspective of logistics and supply chain process.
2. Learn about the distribution, transportation, warehousing related issues and challenges in supply chain.
3. Appreciate the significance of network design in the supply chain.
4. Gain knowledge of various models / tools of measuring the Supply Chain Performance.
5. Appreciate the role of coordination and technology in supply chain management.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		**3**							**2**			
CO2					**3**							**2**
CO3	**3**										**2**	
CO4							**2**					**3**
CO5	**3**		**2**								**1**	

****END****

(A400602) - INDUSTRIAL RELATIONS
(Open Elective-I)

B.Tech : CSE(CS)

L	T	P	C
3	0	0	3

UNIT-I

Overview of Industrial Relations: Meaning & Objectives, Scope, Importance, Approaches to Industrial Relations – Role of Three Actors to Industrial Relations – State, Employer & Employees, Causes for poor IR, Developing sound IR. Ethical approach to IR: Idea of trusteeship – Principles & features, Code of conduct. The industrial policy resolution 1991.ILO in IR. Collective Bargaining (Perspective, Bargaining Structure, Procedure and Machinery for Collective Bargaining) – The Bargaining Process – Strengths and Skills

UNIT-II

Laws on Industrial Relations: The Trade Union Act 1926: Role & function of Trade union, Registration, Rights and privileges, Duties, Dissolution of Trade Unions.

Industrial Disputes Act 1947: Strike, Lockout, Layoff, Retrenchment, Grievance and disciplinary procedures, Penalties, Causes, Tripartite & Bipartite Bodies, and Grievance Procedure.

Industrial Employment Act, 1946: Information in standing orders, Procedure for submission

UNIT-III

Laws on Wages, Welfare and Social Security: Minimum Wages Act, 1948, Payment of Wages Act, 1936, Payment of Bonus Act, 1965 Laws on Labour Welfare: The Workmen's Compensation Act, 1923, The Employees' State Insurance Act,1948, The Maternity Benefit Act, 1961.Laws on Social Security: The Employee's Provident Fund Act, 1952, The Payment of Gratuity Act, 1972.

UNIT-IV

Laws on Working Conditions: Factories Act, 1948: Health, Welfare, Safety, Working Hours, Annual Leave with wages, Registers and Records. Contract Labour (Regulation and Abolition) Act, 1986 – Child Labour (Prohibition and Regulation Act, 1986)

UNIT-V

Quality of Work Life and Quality Circles: Meaning of quality of work life – Quality Circles- Objectives- Process, Structure and problems- workers participation in management and quality circles – Concept of empowerment.

TEXT BOOKS:

1. ArunMonappa (2020). Industrial Relations. New Delhi: Tata McGraw- Hill Publishing company Ltd.

2. Mamoria C.B, Mamoria, G. (2021). Dynamics of Industrial Relations. New Delhi: Himalayan Publications,

REFERENCE BOOKS

1. Padhi,P.K.(2012).Labour &Industrial Laws. New Delhi: PHI Learning P.Ltd.
2. Kapoor, N.D. (2014). Elements of Mercantile Law. New Delhi: S.Chand &Co.
3. Subramani, P N. &Rajendran, G. (2001). Human Resources Management and Industrial Relations. New Delhi: Himalaya Publishing House.
4. Pylee, P V. & A Simon George. (2007). Industrial relations and personnel Management. New Delhi: Vikas Publishing House Pvt. Ltd., New Delhi.
5. Verma, P. (1991). Management of Industrial Relations Reading and cases. Oxford and IBH publications.

COURSE OUTCOMES

On completion of the course students will be able to

1. Access the concept and Scope of Industrial Relations and its resolution.
2. Outline the knowledge towards Trade unions, Industrial disputes and Grievance Procedure.
3. Identify various Laws on Wages, Welfare and Social Security.
4. Illustrate rules and regulations of working conditions.
5. Enlighten on quality standards in industry.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		**3**						**2**				
CO2											**3**	**2**
CO3		**2**		**3**								
CO4					**2**							**3**
CO5					**2**					**3**		

****END****

(A401601)-DISASTER PREPAREDNESS & PLANNING MANAGEMENT
(Open Elective – I)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I:

Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT - II

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT - III

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT - IV

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT - V

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmentally friendly recovery; reconstruction and development methods.

TEXTBOOKS:

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

REFERENCE BOOKS:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
4. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC
5. Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

COURSE OUTCOMES:

On completion of the course students will be able to

1. Analyze impact of disasters
2. Identify the natural and man-made disasters and its vulnerability
3. Relate the disaster impacts at national and global context
4. Develop strategies to cope up with disasters.
5. Build disaster management plan

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	2		3	2	1	3
CO2	3	3	2	2	1	2	2		3	2	1	3
CO3	3	3	2	2	1	2	2		3	2	1	3
CO4	3	3	2	2	1	2	2		3	2	1	3
CO5	3	3	2	2	1	2	2		3	2	1	3

****END****

(A401602)- ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective – I)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I:

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, international agreements.

UNIT- II

EIA Methodologies: Environmental attributes -Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods- Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT- III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT- IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wildlife act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria case studies.

UNIT- V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXTBOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996

COURSE OUTCOMES:

On completion of the course students will be able to

1. Identify the attributes to be considered for EIA.
2. Assess impact of deforestation
3. Interpret impact prediction, significance of soil quality and mitigation.
4. Conduct environmental audit and prepare reports.
5. Illustrate environmental policies and provisions.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**							**3**	**2**		**3**
CO2	**3**	**3**							**3**	**2**		**3**
CO3	**3**	**3**							**3**	**2**		**3**
CO4	**3**	**3**							**3**	**2**		**3**
CO5	**3**	**3**							**3**	**2**		**3**

****END****

(A404603) SENSORS & TRANSDUCERS
(Open Elective-II)

B.Tech:CSE(CS)

L	T	P	C
3	0	0	3

Unit – I:

Introduction: Definition, principle of sensing & transduction, classification.

Mechanical and Electromechanical sensor: Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types- Reluctance change type, Mutual inductance change type, Magnetostrictive type, material, construction and input output variable, Ferromagnetic plunger type, short analysis.

Unit – II:

Capacitive sensors: variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity, Proximity sensor. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

Unit – III:

Thermal sensors: Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermistor material, shape, ranges and accuracy specification. Thermoemf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. Radiation sensors: types, characteristics and comparison, Pyro electric type.

Unit – IV:

Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive cell types, materials, construction, response. Geiger counters, Scintillation detectors.

Unit – V: Film Sensors: Thick film and thin film types, Electroanalytic sensors – Electrochemical cell, Polarization types, and membrane electrode types.

Biosensors, Smart/Intelligent sensors, Nano-sensors, Nano-tube sensors, molecular and quantum sensors.

TEXT BOOKS:

1. Sensor & transducers, D. Patranabis, 2nd edition, PHI
2. Instrument transducers, H.K.P. Neubert, Oxford University press.
3. Measurement systems: application & design, E.A.Doebelin, McGraw Hill.

REFERENCE BOOKS:

1. Sensor and Transducers, Third Edition, Ian Sinclair, Newnes.
2. Sensor Technology, Hand Book, JON S. Wilson, Newnes..ELSEVIER.
3. Sensor and Transducers, Characteristics, Applications, Instrumentation, Interfacing, Second Edition, M.J.Usher and D.A.Keating, MACMILLAN Press Ltd.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain the basic concepts of mechanical and electromechanical sensors, their electrical characteristics.
2. Analyze various capacitor sensors, ultrasonic sensors their electrical characteristics.
3. Compare and elaborate various thermal sensors, principle of operation.
4. Distinguish various magnetic sensors based on their operations, radiation sensors and their operation.
5. Analyze various film sensors and operation of different nano sensors and their applications.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										**1**
CO2	**3**	**2**										**1**
CO3	**3**	**2**										**1**
CO4	**3**	**2**										**1**
CO5	**3**	**2**										**1**

****END****

(A404604) IMAGE PROCESSING
(Open Elective-II)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

Unit- I:

Digital Image Fundamentals Digital Image fundamentals, Components of Digital Image Processing, Sampling and Quantization, Relationship between pixels.

Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform.

Unit-II:

Image Enhancement (Spatial Domain),Introduction, Image Enhancement in Spatial domain, Enhancement through point operation, Types of point operation, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighborhood operation, Median filter, image Smoothing & Sharpening

Image Enhancement (Frequency Domain)

Filtering in Frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, image Smoothing & Sharpening.

Unit- III:

Image Restoration, Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration.

Unit- IV:

Image Segmentation, Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation. Morphological Image Processing: Dilation and Erosion, Structuring Element Decomposition, Opening and Closing, Hit or Miss Transformation.

Unit- V:

Image Compression, Redundancies and their removal methods, Fidelity criteria, Image compression models, Huffman and Arithmetic Coding, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

TEXTBOOKS:

1. Digital Image Processing – Rafael C. Gonzalez, Rechard E. Woods, 3rd edition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

REFERENCE BOOKS:

1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press, 2010.

COURSE OUTCOMES

On completion of the course students will be able to

1. Describe the fundamentals of digital image processing.
2. Distinguish between spatial domain enhancement and frequency domain enhancement.
3. Explain various image degradation models for image restoration.
4. Analyze the image restoration and segmentation methods.
5. Discriminate between lossless and lossy compression techniques.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										**1**
CO2	**3**	**3**										**1**
CO3	**3**	**3**	**2**									**1**
CO4	**3**	**3**	**2**									**1**
CO5	**3**	**3**	**2**									**1**

****END****

(A402603) ELECTRIC VEHICLE TECHNOLOGY
(Open Elective-II)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

Prerequisites: Basics of Electrical Engineering (or equivalent subject)

Unit-I – Introduction to Hybrid Electric Vehicle:
Review of Conventional Vehicle: Introduction to Hybrid Electric Vehicles: Types of EVs, Hybrid Electric Drivetrain, Tractive effort in normal driving.

Unit-II – Electric Drives:
Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor.

Unit- III– Energy Storage:
Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles: - Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system, Design of Hybrid Electric Vehicle and Plug-in Electric Vehicle.

Unit-IV- Energy Management System:
Energy Management Strategies, Automotive networking and communication, EV charging standards, V2G, G2V, V2B, V2H. Business: E-mobility business, electrification challenges, Business- E-mobility business, electrification challenges.

Unit- V – Mobility and Connectors:
Connected Mobility and Autonomous Mobility- case study Emobility Indian Roadmap Perspective. Policy: EVs in infrastructure system, integration of Evs in smart grid, social dimensions of Evs. Connectors- Types of EV charging connector, North American EV Plug Standards, DC Fast Charge EV Plug Standards in North America, CCS (Combined Charging System), CHAdeMO, Tesla, European EV Plug Standards.

TEXTBOOKS

1. Emadi, A. (Ed.), Miller, J., Ehsani, M., “Vehicular Electric Power Systems” Boca Raton, CRC Press, 2003
2. Husain, I. “Electric and Hybrid Vehicles” Boca Raton, CRC Press, 2010.

REFERENCE BOOKS

1. Larminie, James, and John Lowry, "Electric Vehicle Technology Explained" John Wiley and Sons, 2012
2. Tariq Muneer and Irene Illescas García, "The automobile, In Electric Vehicles: Prospects and Challenges", Elsevier, 2017
3. Sheldon S. Williamson, "Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles", Springer, 2013

COURSE OUTCOMES

On completion of the course students will be able to

1. Explain Hybrid Electric Vehicle technology
2. Understand the operation of various Electric Drives used in Hybrid Electric Vehicle
3. Illustrate various energy storage techniques in Hybrid Electric Vehicle
4. Gain Knowledge on Energy Management Strategies in Hybrid Electric Vehicle
5. Understand the different types of Mobility and Connectors in Hybrid Electric Vehicle

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		
CO2	**3**	**3**								**2**		
CO3	**3**	**3**								**2**		
CO4	**3**	**3**								**2**		
CO5	**3**	**3**								**2**		

****END****

(A402604) BASICS OF POWER PLANT ENGINEERING
(Open Elective-II)

B.Tech: CSE (CS)

L	T	P	C
3	0	0	3

UNIT - I

Coal Based Thermal Power Plants: Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.

UNIT - II

Gas Turbine and Combined Cycle Power Plants: Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT - III

Basics of Nuclear Energy Conversion: Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT - IV

Hydroelectric Power Plants: Classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

UNIT - V

Energy, Economic and Environmental Issues: Power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

TEXTBOOKS:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

REFERENCE BOOK:

1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the layout of and various components of Coal Based Thermal Power Plants
2. Understand the operation of Gas Turbine and Combined Cycle Power Plants
3. Illustrate the Nuclear Energy Conversion system.
4. Explain the operation and Classification, typical layout and components of Hydroelectric Power Plants
5. Understand the different parameters associated with Energy, Economic and Environmental Issues.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		
CO2	**3**	**3**								**2**		
CO3	**3**	**3**								**2**		
CO4	**3**	**3**								**2**		
CO5	**3**	**3**								**2**		

****END****

(A405601) FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS
(Open Elective-II)

L	T	P	C
3	0	0	3

B.Tech: CSE (CS)

UNIT-I

Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMS, the Three-Level ANSI-SPARC Architecture,

Database Languages, Data Models, Functions of a DBMS, Components of DBMS. Relational Model: Introduction, Terminology, Integrity Constraints, Views. The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

UNIT–II

SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, creating a Table, changing a Table Definition, removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability 'WITH CHECK OPTION', Advantages and Disadvantages of Views, View Materialization.

UNIT–III

SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ANY and ALL, Multi-table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

UNIT-IV

Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers, Recursion.

UNIT–V

Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization,1NF, 2NF, 3NF, BCNF.

TEXTBOOKS:

1. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill Education, 2003

2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill Education

REFERENCE BOOKS:

1. Thomas M. Connolly, Carolyn E. Begg, Database Systems–A Practical Approach to Design, Implementation, and Management (6e), Pearson publisher
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson publisher

COURSE OUTCOMES

On completion of the course students will be able to

1. Describe Database Management System Architecture.
2. Create, update, and modify Relational Database Objects.
3. Manipulate data in Relational Database
4. Develop PL/SQL programs using Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers.
5. Explain the purpose of normalization and types of Normal forms.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		
CO2	**3**	**3**								**2**		
CO3	**3**	**3**								**2**		
CO4	**3**	**3**								**2**		
CO5	**3**	**3**								**2**		

****END****

(A405605) WEB PROGRAMMING
(Open Elective-II)

L	T	P	C
3	0	0	3

B. Tech: CSE(CS)

Unit-I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups Links and Navigation: Basic Links, Creating Links with the < a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages. Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables Forms: Introducing Forms, Form Controls, Sending Form Data to the Server Frames: Introducing Frameset, <frame>Element, Creating Links Between Frames, setting a Default Target Frame Using <base>Element, Nested Framesets, Inline or Floating Frames with <iframe>. Changing font size, color of text using <font> Element, scrolling text/image using <marquee> Element

Unit-II

Cascading Style Sheets: Introducing CSS, where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, the: focus and: activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout with CSS, Page Layout: Understating the Site's Audience, Page Size, Designing Pages, Coding your Design, Developing for Mobile Devices. Design Issues: Typography, Navigation, Tables, Forms.

Unit-III

Learning JavaScript: How to Add Script to Your Pages, the Document Object Model, Variables, Operators, Functions, Control Statements, Looping, Events, Built- In Objects, Working with JavaScript: Practical Tips for Writing Scripts, Form Validation, Form Enhancements, JavaScript Libraries. Putting Your site on the web: Meta tags, testing your site, Taking the Leap to Live, Telling the World about your site, Understanding your visitors.

Unit-IV

XML - Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

Unit-V

Ajax-Enabled Rich Internet Applications: introduction, history of Ajax, traditional web applications Vs Ajax Applications, RIAs with Ajax, Ajax example using XML HttpRequest object, XML and DOM, creating full scale Ajax-enabled application, Dojo Toolkit.

TEXTBOOK:

1. Jon Duckett, Beginning HTML, XTML, CSS and JavaScript
2. Dietel and Dietel : "Internet and World Wide Web - How to Program", 5th Edition, PHI/Pearson Education, 2011.

REFERENCE BOOKS:

1. Chris Bates, Web Programming
2. M. Srinivasan, Web Technology: Theory and Practice
3. Achyut S. Godbole, AtulKahate, Web Technologies
4. Kogent Learning Solutions Inc, Web Technologies Black Book
5. Ralph Moseley and M. T. Savaliya, Developing Web Applications.

COURSE OUTCOMES

On completion of the course students will be able to

1. Write well-structured, easily maintained, standards-compliant, accessible HTML code.
2. Write well-structured, easily maintained, standards-compliant CSS code to present HTML pages in different way
3. Use JavaScript to add dynamic content to pages.
4. Effectively debug JavaScript code, making use of good practice and debugging tools.
5. Use JavaScript to access and use web services for dynamic content (AJAX, JSON, etc.)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**			**3**							**1**
CO2	**2**	**3**			**3**				**2**			**1**
CO3	**3**	**3**			**3**				**2**			**1**
CO4	**3**	**3**			**3**				**2**			**1**
CO5	**3**	**3**			**3**				**2**			**1**

****END****

(A403603) FUNDAMENTALS OF MANUFACTURING PROCESSES
(Open Elective-II)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT – I

Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting - Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT – II

Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding. Inert Gas Welding - TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT – III

Hot working, cold working, strain hardening, recovery, recrystallisation, and grain growth. Stamping, forming, and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT – IV

Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT – V

Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects –cold forging, swaging, Forces in forging operations.

TEXT BOOKS:

1. Manufacturing Technology / P.N. Rao / Mc Graw Hill
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson.

REFERENCE BOOKS:

1. Metal Casting / T.V Ramana Rao / New Age
2. Métal Fabrication Technology/ Mukherjee/PH

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the idea for selecting materials for patterns.
2. Learn different types and allowances of patterns used in casting and analyze the components of moulds.
3. Design core, core print and gating system in metal casting processes Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticity principles.
5. Identify the effect of process variables to manufacture defect free products.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**2**	**2**	**1**	**1**					**1**	**1**
CO2	**2**	**2**	**2**	**2**			**1**				**1**	**1**
CO3	**2**	**2**	**2**	**2**			**1**				**1**	**1**
CO4	**2**	**2**	**2**	**2**			**1**				**1**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**2**					**1**	**1**

****END****

(A403604) FUNDAMENTALS OF AUTOMOBILE ENGINEERING

(Open Elective-II)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

Unit – I

Introduction: Components of four-wheeler automobile – chassis and body – power unit – power transmission rear wheel drive, front wheel drive, 4-wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, re boring, decarburization

Unit – II

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – Carburetor – types – air filters – petrol injection.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Unit – III

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc. Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

Transmission System: Clutches, principle, types- cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter.
Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types – wheels and tyres.
Steering System: Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism

Unit-V

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

TEXTBOOKS

1. Automobile Engineering, Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering, Vol. 1 & Vol. 2, by K.M Gupta, Umesh publication

REFERENCE BOOKS

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing Pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P. Rami Reddy, Frontline publications.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Identify power generation, transmission and control mechanisms in an automobile
2. Manipulate the chemical, thermal, mechanical and electrical energies in an automobile
3. Infer the interaction between subsystems
4. Analyze how transmission system works
5. Learn different components of suspension systems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1	1	1	3	3					3
CO2	3		1	1	1	3	3					3
CO3	3		3	2	1	3	3					3
CO4	3		3	2	1	3	3					3
CO5	3		1	1	1	3	3					3

****END****

(A400603) ENTREPRENEURSHIP
(Open Elective-II)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

Unit I:

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship- Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.

Unit II:

The individual entrepreneurial mind-set and Personality- The entrepreneurial journey- Stressand the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations. Corporate Entrepreneurial Mindset- the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Unit III:

Launching Entrepreneurial Ventures- opportunities identification- entrepreneurial Imagination and Creativity- the nature of the creativity process-Innovation and entrepreneurship. Methods to initiate Ventures- Creating new ventures- Acquiring an Established entrepreneurial venture- Franchising-hybrid- disadvantage of Franchising.

Unit IV:

Legal challenges of Entrepreneurship-Intellectual property protection-Patents, Copyrights-Trade marks and Trade Secrets-Avoiding trademark pitfalls. Formulation of the entrepreneurial Plan- The challenges of new venture start-ups, Poor financial Understanding-Critical factors for new venture development-The Evaluation process-Feasibility criteria approach.

Unit V:

Strategic perspectives in entrepreneurship- Strategic Planning-Strategic actions- strategic positioning-Business stabilization- Building the adaptive firms-Understanding the growth stage-Unique managerial concern of growing ventures.

TEXTBOOKS:

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 1st edition, 2012. (For PPT, Case Solutions Faculty may visit: login.cengage.com)

2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing, 9th Edition, 2017.
3. Rajeev Roy "Entrepreneurship" 3e, Oxford, 2020.

REFERENCE BOOKS

1. B.Janakiram and M.Rizwana" Entrepreneurship Development :Text & Cases, ExcelBooks, 1st Edition, 2011.
2. Stuart Read, Effectual Entrepreneurship, Routledge, 2nd Edition, 2016.
3. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.

COURSE OUTCOMES

On completion of the course students will be able to

1. Identify the evolution and approaches of Entrepreneurship.
2. Analyze and develop the conceptualization of corporate Entrepreneurship Personality.
3. Explore different possibilities to start an Enterprise for young Entrepreneurs.
4. Outline challenging benchmarks for formulation of Entrepreneurship.
5. Evaluate the application of Strategic action for growing ventures

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				**3**	**2**							
CO2										**2**		**3**
CO3	**3**											**2**
CO4					**2**						**3**	
CO5			**3**	**2**								

****END****

(A400604) ETHICS IN BUSINESS & CORPORATE GOVERNANCE
(Open Elective-II)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

Unit – I:

Business Ethics in the Changing Environment: Business Ethics, Levels of Business Ethics, Myths about Business Ethics, Stages of Moral Development Kohlberg's Study, Carol Gilligan's Theory, Principles of Ethics.

Unit – II:

Professional Ethics: Introduction to Professional Ethics, Ethics in Production and Product Management, Ethics of Marketing Professionals, Ethics in HRM, Ethics of Finance and Accounting Professionals, Ethics of Advertisement, Ethics of Media Reporting, Ethics of Healthcare Services. Ethical Dilemma, Mounting Scandals, Ethical Issues, Preparatory Ethics: Proactive Steps, Cyber Ethics.

Unit – III:

Corporate Governance: Introduction to Corporate Governance, Major Corporate Governance Failures, Need for Corporate Governance, Corporate Governance in India, Theories of Corporate Governance: Agency Theory, Stewardship Theory and Stakeholder Theory, Problems of Governance in Companies, Role of Capital Markets, Regulator, Government in Corporate Governance. Corporate Governance Codes and Committees: Global Reporting Initiative, OECD Principles, Cadbury Committee Report, Kumara Mangalam Birla Committee Report, Naresh Chandra Committee Report, Narayana Murthy Committee Report, SEBI Clause 49 Guidelines, Corporate Governance Committees.

Unit – IV:

Role of Board: Types of Directors Functions of the Board, Structure of the Board, Role of the Board in Subcommittees, Audit, Compensation Committee, Role, Duties and Responsibilities of Directors, Conflicts of Interest, Remedial Actions. Governance Ratings, Merits and Demerits of Governance Ratings.

Unit – V:

Corporate Social Responsibility (CSR): Models for Implementation of CSR, Scope of CSR, Steps to attain CSR, Business Council for Sustainable Development (BCSD) India, Ethics and Social Responsibility of Business, Social Responsibility and Indian Corporations as a Business Strategy for Sustainable Developments Committee, Recent Amendments in Companies Act (Sec:135).

TEXTBOOKS:

1. Jyotsna G B, R C Joshi, Business Ethics and Corporate Governance, TMH, 1e, 2019.
2. Martin J. Ossewaarde, Introduction to Sustainable Development, sage,1e,2018.

REFERENCE BOOKS

1. T.N. Sateesh Kumar, Corporate Governance, Oxford University Press, 2015.
2. SK Mandal, Ethics in Business and Corporate Governance, TMH, 2/e,2017.
3. Archie. B Carroll, Business Ethics-Brief Readings on Vital Topics, Routledge, 2013.
4. A.C. Fernando, Corporate Governance: Principles, Policies and Practices, 2nd Edition, Pearson,2018.
5. C.S.V. Murthy, Business Ethics, 1st Edition, Himalaya Publishing House,2019.
6. N. Balasubramanian, Corporate Governance and Stewardship,TMH,2012.
7. Nina Godbole &SunitBelapure, Cyber Security, wiley india, 2012.
8. Joseph W.Weiss, Business Ethics, Thomson,2006.
9. Geethika, RK Mishra, Corporate Governance Theory and Practice, Excel,2013.
10. Dr.S.S. Khanka, Business Ethics and Corporate Governance, S.Chand,2013.
11. K. Praveen Parboteeach, Business Ethics, Routledge,2019.
12. Praveen B Malla, Corporate Governance, Routledge2016.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the Need for Business Ethics and Corporate Governance in India.
2. Apply Knowledge of Established Methodologies of Solving Professional Ethical Issues.
3. Learn Codes and Committees in Corporate Governance.
4. Understand the Role of Board in Corporate Governance.
5. Assess the Stakeholder perspective of Corporate Governance.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		**3**					**2**					
CO2		**3**										**2**
CO3								**3**	**2**			
CO4						**2**			**3**			
CO5							**2**			**3**		

****END***

(A401603) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS
(Open Elective-II)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT I

Introduction to Photogrammetry: Principles and types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement to single vertical aerial photograph, height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT III

Geographic Information System: Introduction to GIS; components of a GIS; Geo spatial Data: Spatial Data- Attribute data- Joining Spatial and attribute data; GIS Operations: Spatial Data Input – Attribute data Management -Data display Data Exploration – Data Analysis.

Coordinate Systems: Geographic coordinate System: approximation of the Earth, Datum; Map Projections: Types of Map Projections – Map projection parameters – Commonly used Map Projections- Projected coordinate Systems.

UNIT IV

Vector Data Model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape fire; Data models for compost feature Object Based Vector Data Model; Classes and their Relationship; The geo-base data model; Geometric representation of Spatial Feature and data structure, Tomography rules.

UNIT V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion, Integration of Raster and Vector data. Data Input: Metadata, on version of Existing data, creating new data; remote sensing data, filed data

TEXTBOOKS:

1.Remote Sensing and GIS, M. Anji Reddy JNTU Hyderabad, B.S. Publications.
2.Basics of remote sensing & GIS by A. Kumar, Laxmi publications.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W Young, PHI.
2. Introduction to GIS, Kang,Tsurg Charg.Tata McGraw Hill Education Private Ltd.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Illustrate The Principles of Photogrammetry.
2. Make Use of Remote Sensing Process
3. Utilize Gis Principles in Real Life.
4. Explain The Concepts of Topology, Obvdm and Tomography.
5. Develop The Geospatial Data Model with Various File Formats.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**							**3**	**2**		**3**
CO2	**3**	**3**							**3**	**2**		**3**
CO3	**3**	**3**							**3**	**2**		**3**
CO4	**3**	**3**							**3**	**2**		**3**
CO5	**3**	**3**							**3**	**2**		**3**

****END****

(A401604)-SOLID WASTE MANAGEMENT
(Open Elective-II)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT - II

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques.

UNIT- III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

UNIT- IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT- V

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E- waste management, Nuclear Wastes, Industrial waste Management

TEXTBOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA ‘Integrated Solid Waste Management, Engineering Principles and Management Issues’ McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, ‘Solid Waste Engineering’ Brooks/Cole Thomson Learning Inc., 2002.

REFERENCE BOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, ‘Environmental Engineering’, McGraw Hill Inc.,New York, 1985.

2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain the sources of solid waste and its impact.
2. Describe the process of solid waste and its management.
3. Illustrate the process of handling hazardous wastes.
4. Classify various biomedical waste management systems.
5. Apply e-waste management techniques.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**		**1**					**3**	**2**	**1**	**3**
CO2	**3**	**2**		**1**					**3**	**2**	**1**	**3**
CO3	**3**	**2**		**1**					**3**	**2**	**1**	**3**
CO4	**3**	**2**		**1**					**3**	**2**	**1**	**3**
CO5	**3**	**2**		**1**					**3**	**2**	**1**	**3**

****END****

(A404605) FUNDAMENTALS OF EMBEDDED SYSTEMS
(Open Elective-III)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

Unit- I:

Introduction to Embedded Systems Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems

Unit- II:

Typical Embedded System Core of the Embedded System: General Purpose and Domain Specific Processors, Memory, ROM, RAM, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

Unit –III:

Embedded Firmware Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit – IV:

RTOS Based Embedded System Design Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit – V:

Task Communication Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers

TEXT BOOKS:

1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill
2. Embedded Systems – Raj Kamal, TMH

REFERENCE BOOKS:

1. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer- David E Simon, Pearson Education

COURSE OUTCOMES:

At the end of the course the student will be able to:

1. Explain the basics of embedded systems and classify its applications.
2. Compare various types of memories, sensors, and Input / Output devices.
3. Summarize the embedded firmware for various applications.
4. Interpret the characteristics of Real time operating Systems.
5. Illustrate the concepts of shared memory and task communications.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**											
CO2	**3**	**1**	**1**									
CO3	**2**											**1**
CO4	**2**	**1**	**1**	**1**								
CO5	**3**				**1**							

****END****

(A404606) DATA COMMUNICATIONS
(Open Elective-III)

B.Tech:CSE(CS)

L	T	P	C
3	0	0	3

Unit I:

Introduction to data communications, networking, signals, noise, modulation and demodulation. Data communication network architecture, layered network architecture, open systems interconnection, data communications circuits, serial and parallel data transmission, data communications circuit arrangements, data communication networks, alternate protocol suites. Information capacity, bits, bit rate, baud, and M-ARY encoding.

Unit II:

Metallic cable transmission media & optical fiber transmission media: metallic transmission lines, transverse electromagnetic waves, characteristics of electromagnetic waves, transmission line classifications, metallic transmission line types, metallic transmission line equivalent circuit, wave propagation on metallic transmission lines, metallic transmission line losses, block diagram of an optical fiber communications system, optical fiber versus metallic cable facilities.

Unit III:

Digital transmission & multiplexing and t-carriers digital transmission: pulse modulation, pulse code modulation, dynamic range, signal–to-quantization noise voltage Ratio, linear versus nonlinear PCM codes

Multiplexing: Time- division multiplexing, t1 digital carrier system, north American digital multiplexing hierarchy, digital line encoding, t carrier systems, European digital carrier system, statistical time – division multiplexing, frame synchronization, frequency- division multiplexing, wavelength- division multiplexing, synchronous optical network.

Unit IV:

Telephone instruments and signals: The subscriber loop, standard telephone set, basic telephone call procedures, call progress tones and signals, cordless telephones, caller id, electronic telephones, paging systems. The telephone circuit: The local subscriber loop, telephone message-channel noise and noise weighting, units of powers measurement, transmission parameters and private-line circuits, voice-frequency circuit arrangements, crosstalk.

Unit V:

Data communication codes, bar codes, error control, error detection, error correction, data formats, data communications hardware, character synchronization.

TEXTBOOKS:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

REFERENCE BOOKS:

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.Tmh.
2. Computer Communications and Networking Technologies, Gallow, Second edition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

COURSE OUTCOMES:

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

1. Explain the basic concepts of data communication systems.
2. Distinguish various types of transmission Medias for data communications.
3. Compare different multiplexing techniques for digital transmission.
4. Analyze different telephone instruments, signal and circuits.
5. Identify different error detecting and correcting codes.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**									**2**
CO2	**3**	**3**	**2**									**2**
CO3	**3**	**3**	**2**									**2**
CO4	**3**	**3**	**2**									**2**
CO5	**3**	**3**	**2**									**2**

****END****

(A402605) NANO TECHNOLOGY
(Open Elective-III)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT I:

INTRODUCTION

History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects.

UNIT II:

UNIQUE PROPERTIES OF NANOMATERIALS

Microstructure and Defects in Nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and declinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility. Magnetic Properties: Soft magnetic nano crystalline alloy, Permanent magnetic nano-crystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT III:

SYNTHESIS ROUTES

Bottom-up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Self-assembly, Top-down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing, Spark plasma sintering.

UNIT IV:

TOOLS TO CHARACTERIZE NANO MATERIALS

X- Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT V:

APPLICATIONS OF NANOMATERIALS

Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nano sensors, Nano catalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Défense and Space Applications, Concerns and challenges of Nanotechnology.

TEXTBOOKS:

1. Textbook of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wley India Edition, 2012.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press 2000.
4. Nanofabrication towards biomedical application: Techniques, tools, Application, and impact – Ed. Challa S., S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems - S. Dutta, Cambridge University press

COURSE OUTCOMES

On completion of the course students will be able to

1. Classify nanostructured materials.
2. Illustrate the characteristics and properties of nanomaterials.
3. Identify the synthesis routes of nanomaterials.
4. Make use of the tools to characterize the nanomaterials.
5. Utilize the nanomaterials for various applications

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**						**2**		
CO2	**3**	**3**	**3**							**2**		
CO3	**3**	**3**								**2**		
CO4	**3**	**3**			**2**					**2**		
CO5	**3**	**3**								**2**		

END

(A402606) EV BATTERIES & CHARGING SYSTEM
(Open Elective-III)

L	T	P	C
3	0	0	3

B. Tech: CSE(CS)

Prerequisites: Basics of Electrical Engineering (or equivalent subject)

UNIT I - Battery parameters:
Cell and battery voltages, Charge (or Amp hour) capacity, Energy stored, Energy density, Specific power, Amphour (or charge) efficiency, Energy efficiency, Self-discharge rates, Battery geometry, Battery temperature, heating and cooling needs, Battery life and number of deep cycles.

UNIT II – EV Batteries:
Lead Acid Batteries Lead acid battery basics, Special characteristics of lead acid batteries, Battery life and maintenance, Battery charging, Summary Nickel-based Batteries Introduction, Nickel cadmium, Nickel metal hydride batteries.

UNIT III– Sodium, Lithium and Metal air batteries:
Sodium-based Batteries Introduction, Sodium Sulphur batteries, Sodium metal chloride (Zebra) batteries Lithium Batteries Introduction, The lithium polymer battery, The lithium-ion battery Metal Air Batteries Introduction, The aluminum air battery, The zinc air battery

UNIT IV– Charging Infrastructure:
Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

UNIT V– EV Charging Battery Chargers:
Charge equalization, Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off- board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods

TEXTBOOKS

1. James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., UK, Electric Vehicle Technology Explained
2. 2.C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001.

REFERENCE BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

COURSE OUTCOMES

On completion of the course students will be able to

1. Gain knowledge on various battery parameters.
2. Classify different types of EV batteries.
3. Illustrate Sodium, Lithium and Metal air batteries.
4. Understand the different types of Charging Infrastructure.
5. Understand the operation of EV Charging Battery Chargers

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		
CO2	**3**	**3**								**2**		
CO3	**3**	**3**								**2**		
CO4	**3**	**3**								**2**		
CO5	**3**	**3**								**2**		

****END****

(A405603) FUNDAMENTALS OF COMPUTER NETWORKS
(Open Elective-III)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT-I

Fundamental of Data Communication and Computer Network: Components, Data Representation, Data Flow, Data and Signal, Classification Network: LAN, WAN, MAN, Network Architecture: Peer to Peer, Client Server Network, History of Internet.

UNIT-II

Network Model: OSI Reference Model and TCP/IP Protocol Suit

Network Connecting Devices: Hub, Switch, Router, Repeater, Bridge, Gateway, Modem

Network Topologies: Types of Topology-Bus, Ring, Star, Mesh, Tree, Hybrid, and IEEE Standards.

UNIT-III

Physical Layer: Guided Transmission Media and Unguided Transmission Media

Data Link Layer: Design Issues, Error Detection and Correction, Simplex Stop and wait protocol.

UNIT-IV

Network Layer: Design Issues, Routing Algorithm: Shortest Path Routing algorithm, Congestion Control, IPv4, IPv6, DHCP

Transport Layer: Process to process Delivery, Addressing, UDP and TCP, Error control and flow control.

UNIT-V

Application Layer: Domain Name System, E-Mail, FTP, WWW and Http.

Network Security: Cryptography, Symmetric Key and Public Key, Firewall, VPN, Web Security

TEXTBOOKS:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Computer Networking A Top-Down Approach – Kurose James F, Keith W, 6th Edition, Pearson
3. Data communication and Networks - Bhushan Trivedi, Oxford university press, 2016.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain the Data in communication and two types of networks architecture.
2. Compare OSI Reference model and TCP/IP Protocol Suit and able to Sketch the different topologies and network connecting devices.
3. Describe about Transmission media in Physical layer and Analyze the Error detection and correction methods in Data link layer.
4. Apply knowledge in developing routing algorithm and Explain transport layer protocols.
5. Examine the Application layer Protocols and Analyze various network security approaches.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		**3**
CO2	**3**	**3**								**2**		**3**
CO3	**3**	**3**								**2**		**3**
CO4	**3**	**3**								**2**		**3**
CO5	**3**	**3**								**2**		**3**

****END****

(A405606) FUNDAMENTALS OF DEVOPS
(Open Elective-III)

B. Tech: CSE (CS)

L	T	P	C
3	0	0	3

UNIT - I

Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT - II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV

Integrating the system: Build systems, Jenkins build server, managing build dependencies, Jenkins plugins, and file system layout, The host server, build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client,
Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXTBOOKS:

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOK:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

1. Identify components of Devops environment
2. Describe Software development models and architectures of DevOps
3. Apply different project management, integration, testing and code deployment tool
4. Investigate different DevOps Software development models
5. Collaborate and adopt Devops in real-time projects

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**								**2**		**3**
CO2	**3**	**3**								**2**		**3**
CO3	**3**	**3**								**2**		**3**
CO4	**3**	**3**								**2**		**3**
CO5	**3**	**3**								**2**		**3**

****END****

(A403605) INDUSTRIAL SAFETY ENGINEERING
(Open Elective III)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT-I:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relationship with replacement economy, Service life of equipment.

UNIT-III:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV:

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

TEXTBOOKS

1. Mobley, R. Keith, Lindley R. Higgins, and Darrin J. Wikoff. Maintenance Engineering Handbook. New York, NY: McGraw-Hill, 2008.
2. Garg, H. P. Industrial Maintenance. S Chand, 1976.

REFERENCE BOOKS:

1. Graham, F. D. "Aludels Pumps, Hydraulics and Air Compressors. Theo." (1998).
2. Winterkorn, Hans F., and Hsia-Yang Fang. Foundation engineering handbook. Springer, Boston, MA, 1991.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand various hazards and their prevention.
2. Apply maintenance techniques to various equipment.
3. Understand types of wear and corrosions and their prevention.
4. Explain fault tracing and its applications.
5. Apply periodic and preventive maintenance techniques to various equipment.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**1**				**1**		**3**	**3**
CO2	**3**	**3**	**3**	**3**	**1**				**1**		**3**	**3**
CO3	**3**	**3**	**3**	**3**	**1**				**1**		**3**	**3**
CO4	**3**	**3**	**3**	**3**	**1**				**1**		**3**	**3**
CO5	**3**	**3**	**3**	**3**	**1**				**1**		**3**	**3**

****END****

(A403606) WASTE TO ENERGY
(Open Elective III)

L	T	P	C
3	0	0	3

B. Tech: CSE(CS)

Unit-I:

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

Unit-II:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV:

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXTBOOKS:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Handbook - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCE BOOKS:

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons,1996.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand different Conversion Devices.
2. Explain Biomass Pyrolysis.
3. Understand the working Principle of biomass gasification
4. Explain Biomass Combustion.
5. Know the application of Biogas

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**3**	**3**	**2**	**1**	**2**		**2**			**2**
CO2	**3**	**2**	**2**	**3**	**2**	**1**	**2**		**2**			**2**
CO3	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO4	**3**	**3**	**1**	**3**	**1**	**1**	**2**		**2**			**2**
CO5	**3**	**2**	**1**	**3**	**2**	**1**	**2**		**1**			**2**

****END****

(A400605) - BASICS OF MARKETING
(Open Elective III)

L	T	P	C
3	0	0	3

B. Tech: CSE(CS)

Unit I

Understanding Marketing Management: Concepts of Marketing, Marketing Strategies &Plans, Creating long term Loyalty relationships, Marketing mix, Product Life Cycle.

Unit II

Connecting with Customers & Building Strong Brands: Analyzing Competitors, Conducting Marketing Research, Consumer Behaviour, Identifying market segments and targets, crafting Brand Positioning.

Unit III

New Product and Promotions: Introducing New Market Offering, Developing Pricing Strategies & Programmes, Designing & Managing Integrated Marketing Communications, Advertising & Sales Promotions, Managing Digital Communication – Online, Social Media & Mobile, Personal Selling.

Unit IV

Delivering Value: Managing Retailing, Wholesaling and logistics, Designing and Managing Integrated Marketing Channels.

Unit V

Sales Management: Nature and Importance of Sales Management, Skills of Sales Manager, Sales objectives, Concepts of Sales organization, Type of Sales organization.

TEXTBOOKS:

1. Marketing Management, Philip Kotler, Kevin Lane Keller, Pearson

REFERENCES:

1. Rosalind Masterson, Nichola Philips, David Pickton, Marketing: An Introduction, 5e, Sage Publications, 2021.
2. G. Shainesh Philip Kotler, Kevin Lane Keller, Alexander Cherneb, Jagdish N Sheth, Marketing Management, 16e, Pearson, 2022.
3. Lamb, Hair, Sharma, Mc Daniel: MKTG, A South Asian Perspective, Cengage Learning, 2016. (For PPT, Case Solutions, video cases, Faculty may visit: login.cengage.com)
4. Philip Kotler, Gray Armstrong, Principles of Marketing, Pearson Education, 18e,2020.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Analyze the scope, concepts of Marketing and forecasting techniques in present Global Market Environment.
2. Outline marketing research, consumer behavior, segmentation and targeting.
3. Develop conceptual knowledge on new product development, marketing mix and promotional mix
4. Illustrate marketing channels of distribution and logistics.
5. Identify the skills and importance of sales management.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**											**3**
CO2							**2**					**3**
CO3	**2**									**3**		
CO4					**3**				**2**			
CO5						**2**					**3**	

****END****

(A405607) CLOUD COMPUTING
(OPEN ELECTEIVE-III)

B. Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue, service, Microsoft, Windows Azure

TEXTBOOKS:

1. Essentials of cloud Computing: K. Chandrasekharan, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Explain Distributed System Modeling, Clustering and Virtualization
2. Discuss basic concepts of cloud computing.
3. Distinguish Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS/SAAS).
4. Design & implement cloud computing applications.
5. Explore some important cloud computing driven commercial systems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**2**	**3**				**1**					
CO2	**1**	**2**	**1**				**1**					**1**
CO3	**1**	**2**	**1**	**2**	**2**		**1**					**1**
CO4	**1**	**3**	**3**	**1**	**2**		**1**					**1**
CO5	**1**	**2**	**2**	**3**	**2**	**3**	**1**	**2**				**1**

****END****

(A401605) ENERGY EFFICIENT BUILDINGS
(Open Elective-III)

L	T	P	C
3	0	0	3

B.Tech: CSE(CS)

Unit I

Climates and buildings, Thermal properties and energy content of building materials, Psychrometry, thermal comfort: Criteria and various parameters, Air conditioning systems, Energy conservation techniques in Air conditioning systems. Climate and comfort zones, Introduction to the design of shading devices, Overhangs. Factors that effects energy use in buildings: ventilation and its significance.

Unit II

Passive and active methods of heating and cooling, Passive heating concepts: direct heat gain, indirect heat gain, isolated gain and sunspaces. Passive cooling concepts: evaporative cooling, radiative cooling; application of wind, water and earth for cooling; shading, paints and cavity walls for cooling; roof radiation traps; earth air- tunnel.

Unit III

Heat transmission in buildings: surface co-efficient: air cavity, Internal and external surfaces Overall thermal transmittance, Wall and windows; Heat transfer due to ventilation/infiltration, Internal heat transfer; Decrement factor; Phase lag; Lighting (Daylighting and Electric lighting), Design of day- lighting, Concept of sol-air temperature and its significance.

Unit IV

Estimation of building loads, Steady state method, Network method, Numerical method, Correlations. Energy conservation through site selection, Planning and design; Siting and orientation green buildings, Zero emission buildings. Energy Efficient Landscape Design: Modification of microclimatic through landscape element for energy conservation.

Unit V

Bioclimatic classification of India; Passive concepts appropriate for the various climatic zones in India; Typical design of selected buildings in various climatic zones; Thumb rules for design of buildings and building codes Energy Efficient Landscape Design: Modification of microclimatic through landscape element for energy conservation

TEXTBOOKS:

1. Tiwari G N, Goyal R K, Greenhouse Technology: Fundamentals, Design Modeling and Application, Narosa Publishing House.

2. Krieder J, Rabi A, Heating and Cooling of Buildings: Design for Efficiency, McGraw Hill.

REFERENCE BOOKS:

1. Archie, Culp W, Principles of Energy Conservation, McGraw Hill.
2. Callaghan P O, Energy Management, McGraw - Hill Book Company.
3. Williams J R, Passive Solar Heating, Ann Arbar Science.
4. Majumder Milli, Energy Efficient Buildings, TERI, New Delhi.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Identify different Energy conservation techniques in Air conditioning systems.
2. Demonstrate a good ability to calculate the energy balance of buildings.
3. Assess whether there is a potential conflict between energy conservation and indoor climate for different energy saving measures.
4. Evaluate different opportunities to save energy with measures regarding both building technology and building services engineering.
5. Able to design different buildings in various climatic zones.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2	3	3			3	2		3
CO2	3	3		2	3	3			3	2		3
CO3	3	3		2	3	3			3	2		3
CO4	3	3		2	3	3			3	2		3
CO5	3	3		2	3	3			3	2		3

END

(A401606) ENVIRONMENTAL POLLUTION
(Open Elective-III)

B.Tech: CSE(CS)

L	T	P	C
3	0	0	3

UNIT - I

Air Pollution: Air pollution Control Methods – Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement, and control methods –Reducing residential and industrial noise –ISO: 14000.

UNIT - II

Industrial wastewater Management: Strategies for pollution control –Volume and Strength reduction –Neutralization – Equalization – Proportioning –Common Effluent Treatment Plants – Recirculation of industrial wastes –Effluent standards.

UNIT - III

Solid Waste Management: Solid Waste Management: solid waste characteristics –basics of on-site handling and collection – separation and processing –Incineration-Composting-Solid waste disposal methods –fundamentals of Land filling. Hazardous Waste: Characterization –Nuclear waste –Biomedical wastes –Electronic wastes
–Chemical wastes –Treatment and management of hazardous waste-Disposal and Control methods.

UNIT - IV

Environmental Sanitation: Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation- low-cost waste disposal methods.

UNIT - V

Sustainable Development: Sustainable Development: Definition-elements of sustainable developments-Indicators of sustainable development-Sustainability Strategies-Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability-sustainable development.

TEXTBOOKS

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, “Environmental Engineering”, G. Mc - Graw Hill International Editions, New York 1985. .
2. J. G. Henry and G.W. Heinke, “Environmental Science and Engineering”, Pearson Education.

REFERENCE BOOKS

1. G. L. Karia and R.A. Christian, "Wastewater treatment-concepts and design approach", Prentice Hall of India
2. M.N.Rao and H.V. N. Rao, "Air pollution", Tata Mc.GrawHill Company.
3. Ruth F. "Weiner and Robin Matthews Environmental Engineering", 4th Edition Elesevier, 2003.
4. K. V. S. G. Murali Krishna, "Air Pollution and Control"by, Kousal & Co. Publications, New Delhi.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Define the air pollution control methods.
2. Able to evaluate Volume and Strength reduction.
3. Identify the different ways to dispose Solid waste.
4. Identify the sanitation methods.
5. Products that accelerate a more sustainable lifestyle.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**		**2**		**2**	**3**		**3**	**2**		**3**
CO2	**3**	**3**		**2**		**2**	**3**		**3**	**2**		**3**
CO3	**3**	**3**		**2**		**2**	**3**		**3**	**2**		**3**
CO4	**3**	**3**		**2**		**2**	**3**		**3**	**2**		**3**
CO5	**3**	**3**		**2**		**2**	**3**		**3**	**2**		**3**

END