



CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

Approved by AICTE-New Delhi | Affiliated to JNTUH | Accredited by NAAC & NBA

R22

CSE-Cyber Security

SYLLABUS

**Academic Regulations, Course Structure and
Detailed Syllabus under Autonomous Status**

**BACHELOR OF TECHNOLOGY
(B.TECH.)**

(CMREC – R-22 Regulations)

(Applicable for the batch admitted from 2022-2023)

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- **AICTE:** Means All India Council for Technical Education, New Delhi.
- **Autonomous Institute:** Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Hyderabad) and State Government of Telangana.
- **Academic Autonomy:** Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.
- **Academic Council:** The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.
- **Academic Year:** It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd + one even) and supplementary semester.
- **Branch:** Means specialization in a program like B.Tech. Degree program in Electronics and communication Engineering, B.Tech degree program in Computer Science and Engineering, etc.
- **Board of Studies (BOS):** BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.
- **Backlog Course:** A course is considered to be a backlog course, if the student has obtained a failure grade (F) in that course.
- **Basic Sciences:** The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.
- **Commission:** Means University Grants Commission (UGC), New Delhi.
- **Choice Based Credit System:** The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.
- **Compulsory course:** Course required to be undertaken for the award of the degree as per the program.
- **Continuous Internal Examination:** It is an examination conducted towards sessional assessment.
- **Core:** The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.
- **Course:** A course is a subject offered by a department for learning in a particular semester.
- **Course Outcomes:** The essential skills that need to be acquired by every student through a course.
- **Credit:** A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial/lab hour per week.
- **Credit point:** It is the product of grade point and number of credits for a course.

- **Cumulative Grade Point Average (CGPA):** It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
- **Curriculum:** Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.
- **Department:** An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.
- **Dropping from Semester:** Student who does not want to register for any semester can apply in writing in prescribed format before the commencement of that semester.
- **Elective Course:** A course that can be chosen from a set of courses. An elective can be Professional Elective and or Open Elective.
- **Evaluation:** Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.
- **Grade:** It is an index of the performance of the students in a said course. Grades are indicated by alphabets.
- **Grade Point:** It is a numerical weight allotted to each letter grade on a 10 - point scale.
- **Honors:** An Honors degree typically refers to a higher level of academic achievement at an undergraduate level.
- **Institute:** Means CMR Engineering, Hyderabad unless indicated otherwise by the context.
- **Massive Open Online Courses (MOOC):** MOOC courses inculcate the habit of self-learning. MOOC courses would be additional choices in all the elective group courses.
- **Minor:** Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech. Degree.
- **Pre-requisite:** A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.
- **Professional Elective:** It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.
- **Program:** Means, UG degree program: Bachelor of Technology (B.Tech.) and PG degree program: Master of Technology (M.Tech.).
- **Program Educational Objectives:** The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.
- **Project work:** It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.
- **Re-Appearing:** A student can reappear only in the semester end examination for theory component of a course, subject to the regulations contained herein.

- **Registration:** Process of enrolling into a set of courses in a semester of a program.
- **Regulations:** The regulations, common to all B.Tech. Programs offered by Institute, are designated as – CMREC Regulations – R-22 and are binding on all the stakeholders.
- **Semester:** It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. Odd semester commences usually in July and even semester in December of every year.
- **Semester End Examinations:** It is an examination conducted for all courses offered in a semester at the end of the semester.
- **Student Outcomes:** The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.
- **University:** Means Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, is an affiliating University.
- **Withdraw from a Course:** Withdrawing from a course means that a student can drop from a course within the first two weeks of odd or even semester. However, he / she can choose a substitute course in place of it by exercising the option within 5 working days from the date of withdrawal.

FOREWORD

The autonomy is conferred to **CMR Engineering College (CMREC)**, Hyderabad by University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies including JNT University Hyderabad (JNTUH), Hyderabad and AICTE, New Delhi. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf. Thus, an autonomous institution is given the freedom to have its own **examination system** and **monitoring mechanism**, independent of the affiliating University but under its observance.

CMREC is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies such as Academic Council and Board of Studies (BOS) are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUH to frame the regulations, course structure, and syllabi under autonomous status.

The autonomous regulations, course structure, and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the institute in order to produce a quality engineering graduate to the society.

All the faculty, parents, and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and from the principal of the institute, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is requested for the successful implementation of the autonomous system in the larger interests of the institute and brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS (R22) FOR B.TECH REGULAR STUDENTS WITH EFFECT FROM THE ACADEMIC YEAR 2022-23

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

Jawaharlal Nehru Technological University Hyderabad (JNTUH) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) at its non-autonomous constituent and affiliated colleges with effect from the academic year 2022-23.

2.0 Eligibility for Admission

- 2.1 Admission to the undergraduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET) or the University or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.
- 2.2 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 ≥ 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 of 22 weeks (≥ 90 instructional days) each and in each 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)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES - Engineering Sciences	Includes Fundamental Engineering Subjects
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (ELC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – 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	Project Work	B.Tech. Project or UG Project or UG Major Project or Project Stage I & II
8		Industry Training/ Internship/ Industry Oriented Mini-	Industry Training/ Internship/ Industry Oriented Mini-Project/ Mini-Project/ Skill Development Courses
9		project/ Mini- Project/ Skill Development Courses	
	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 HS)
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 like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab) 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. **This attendance should also be included in the attendance uploaded every fortnight in the University Website.**
- 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) Industry Oriented Mini Project (or) Internship (or) 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 Industry Oriented 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 Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship 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	Regular course of study of first year second semester. 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	Regular course of study of second year second semester. 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	Regular course of study of third year second semester. 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) **passes all the mandatory courses**, to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA (**at the end of undergraduate programme**), and shall be indicated in the grade card / marks memo of IV-year II semester.
- 7.5. If a student registers for '**extra 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 practical's 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 paper/Short Answers for 10 marks.(5*2=10Marks)
 - b. Part - B : Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 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 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 Overall 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 $\geq 35\%$ (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 in spite of appearing the SEE.*

There is NO Computer Based Test (CBT) 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 Overall 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 $\geq 35\%$ (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 in spite of appearing the SEE.

- 8.4 There shall be an Industry training (or) Internship (or) Industry oriented Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during 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) Industry Oriented 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 Industry Oriented 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 (or) Industry Oriented Mini Project.
- 8.5 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.
- 8.6 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.
- 8.7. 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.
- 8.8 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 Industry Oriented 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, University selects an external examiner from the list of experts in the relevant branch submitted by the Principal of the College.
- 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.

8.9. A student shall be given only one time chance to re-register for a maximum of two 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.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year.

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

9.0 Grading Procedure.

9.1 Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/Practicals/ Industry-Oriented 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 ($\sum CP$) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$\text{SGPA} = \{ \sum_{i=1}^N C_i G_i \} / \{ \sum_{i=1}^N C_i \} \dots \text{For each semester,}$$

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

$$\text{CGPA} = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{for all S semesters registered}$$

(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 1st semester onwards up to and inclusive of the 8th 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	$4 \times 8 = 32$
Course 2	4	O	10	$4 \times 10 = 40$
Course 3	4	C	5	$4 \times 5 = 20$
Course 4	3	B	6	$3 \times 6 = 18$
Course 5	3	A+	9	$3 \times 9 = 27$
Course 6	3	C	5	$3 \times 5 = 15$
	21			152

$$\text{SGPA} = 152/21 = 7.24$$

Illustration of Calculation of CGPA up to 3rd Semester:

Semester	Course/ Subject Title	Credits Allotted	LetterGrade Secured	CorrespondingGrade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21

III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

$$\text{CGPA} = 518/69 = 7.51$$

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.

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

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**’. How-

ever, 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 class work 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 University 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 R20 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, III and IV years of R20 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 R20 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 total credits required are 160 including both R20 & R22 regulations. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The 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 University.

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 College Principals concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

15. Student Transfers

- 15.1 There shall be no branch transfers after the completion of admission process.
- 15.2 There shall be no transfers from one college/stream to another within the constituent colleges and units of Jawaharlal Nehru Technological University Hyderabad.
- 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

- 16.1 The academic regulations should be read as a whole, for the purpose of any interpretation.
- 16.2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- 16.3 The University 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 University authorities.
- 16.4. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

**ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)
FROM THE AY 2023-24**

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	Regular course of study of second year second semester. 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	Regular course of study of third year second semester. 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.

Malpractices Rules
Disciplinary Action For / Improper Conduct in Examinations

	Nature of Malpractices/Improperconduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student 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.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student 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 students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student 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 student is also debarred for two consecutive

		semesters from class work and all University examinations. The continuation of the course by the student 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 in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student 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 examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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 student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

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

12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award a suitable punishment.	
-----	---	--

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.
2. Punishment for Institutions: (if the squad reports that the college is also involved in encouraging malpractices)
 - A show-cause notice shall be issued to the college.
 - Impose a suitable fine on the college.
 - Shifting the examination center from one college to another college for a specific period of not less than one year.

* * * * *

B.Tech. in COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)
Choice Based Credit System (CBCS)- COURSE STRUCTURE REGULATIONS R-22

Applicable From 2022-23 Admitted Batch

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Matrix Algebra and Differential Equations	3	1	0	4
2	AP102BS	Applied Physics	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EE104ES	Basic Electrical Engineering	3	0	0	3
5	IT105ES	IT Workshop	0	0	3	1.5
6	AP106BS	Applied Physics Lab	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EE108ES	Basic Electrical Engineering Lab	0	0	2	1
9	SD109EN	Skill Development Course - I (Interchange - Business English)	0	0	2	1
		Induction Programme				
Total Credits			12	2	12	20

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Vector Calculus and Transforms	3	1	0	4
2	CH202BS	Engineering Chemistry	3	1	0	4
3	AI203ES	Data Structures Through C++	3	1	0	4
4	EN204HS	English for Skill Enhancement	2	0	0	2
5	ME205ES	Computer Aided Engineering Graphics Lab	0	0	3	1.5
6	CH206BS	Engineering Chemistry Lab	0	0	2	1
7	AI207ES	Data Structures Through C++ Lab	0	0	2	1
8	EN208HS	English Language and Communication Skills Lab	0	0	3	1.5
9	SD209BS	Skill Development Course -II (Aptitude and Logic Building)	0	0	2	1
Total Credits			11	3	12	20

II YEAR I SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	CS301PC	Database Management Systems	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	0	0	3
3	CS303PC	Operating Systems	3	0	0	3
4	CS304PC	Object Oriented Programming through Java	3	0	0	3
5	MA305BS	Computer Oriented Statistical Methods	3	1	0	4
6	CS306PC	Database Management Systems Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	2	1
8	CS308PC	Java Programming Lab	0	0	2	1
9	SD309PC	Skill Development Course-III (Data visualization- R Programming/ Power BI)	0	0	2	1
10	*MC311	Gender Sensitization Lab	0	0	2	0
Total Credits			15	1	10	20

II YEAR II SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	CY401PC	Cryptography and Network Security	3	0	0	3
2	IT402PC	Discrete Mathematics	3	0	0	3
3	EC403ES	Analog and Digital Electronics	3	0	0	3
4	AI404PC	Design and Analysis of Algorithms	3	1	0	4
5	CS405PC	Software Engineering	3	0	0	3
6	EC406ES	Analog and Digital Electronics Lab	0	0	2	1
7	CY407PC	Cryptography and Network Security Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real-time Research Project/ Field Based Project	0	0	2	1
10	SD410PC	Skill Development Course-IV (Node JS/ React JS/ Django)	0	0	2	1
11	MC412	Environmental Science	2	0	0	0
Total Credits			17	1	10	21

*MC – Satisfied/Unsatisfied

III YEAR I SEMESTER

S.No.	CourseCode	Course Title	L	T	P	Credits
1	AI501PC	Python Programming	3	0	0	3
2	CS502PC	Automata Theory and compiler design	3	1	0	4
3	SM503MS	Business Economics & Financial Analysis	3	0	0	3
4	CY504PC	Principles of Computer Networks	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	AI505PC	Python Programming Lab	0	0	2	1
7	EN506HS	Advanced Communications Skills Lab	0	0	2	1
8	CY507PC	Principles of Computer Networks Lab	0	0	2	1
9	*MC510	Intellectual Property Rights	2	0	0	0
10	SD512PC	Skill Development Course-V (UI design- Flutter)	0	0	2	1
Total Credits			17	1	8	20

III YEAR II SEMESTER

S.No	CourseCode	Course Title	L	T	P	Credits
1	CS601PC	Introduction to Cyber Security	3	0	0	3
2	CS602PC	Machine Learning	3	0	0	3
3	CY603PC	Cyber Crime Investigation & Digital Forensics	3	0	0	3
4		Professional Elective -II	3	0	0	3
5	CS604PC	Machine Learning Lab	0	0	2	1
6	CY605PC	Cyber Crime Investigation & Digital Forensics Lab	0	0	2	1
7		Open Elective-I / MOOCs	3	0	0	3
8	CS607PROJ	Industrial Oriented Mini Project / Summer Internship/ Skill Development Course-VI (Big data-Spark)	0	0	4	2
9	*MC609	Constitution of India	2	0	0	0
10	*MC611	Artificial Intelligence	2	0	0	0
Total Credits			19	0	8	19

***MC – Satisfied/Unsatisfied**

IV YEAR I SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	AI701PC CS732PE	Deep Learning	3	0	0	3
2	CY702PC	Vulnerability Assessment & Penetration Testing	3	1	0	4
3		Professional Elective course - III	3	0	0	3
4		Professional Elective course -IV	3	0	0	3
5		Open Elective-II / MOOCs	3	0	0	3
6	CY703PC	Vulnerability Assessment & Penetration Testing Lab	0	0	2	1
7	AI704PC	Deep Learning Lab	0	0	2	1
8	CY705PROJ	Project Stage-1	0	0	6	3
Total Credits			15	1	10	21

IV YEAR II SEMESTER

S.No.	CourseCode	Course Title	L	T	P	Credits
1		Professional Elective course -V/ MOOCs	3	0	0	3
2		Professional Elective course -VI	3	0	0	3
3		Open Elective-III / MOOCs	3	0	0	3
4	CY801PROJ	Seminar	0	0	2	1
5	CY802PROJ	Project-II	0	0	18	9
Total Credits			9	0	20	19

Professional Elective – I

1	CY511PE	Introduction to Cloud Security
2	CY512PE/AI504PC	Data Analytics using R
3	CY513PE	Introduction to Cyber Law
4	CY514PE	Cloud Computing

Professional Elective - II

1	CY621PE	Databases Security
2	CY622PE	Data Privacy
3	CS623PE	Software Project Management
4	CY624PE	Ethical Hacking

Professional Elective - III

1	CY731PE	Mobile Application Security
2	AI732PE/CS701PC	Big Data Analytics
3	CY733PE	Malware Analysis
4	CY734PE	Edge Analytics

Professional Elective - IV

1	CY741PE	Blockchain Technology
2	CY742PE	Social Media Security
3	CY743PE	Web & Database Security
4	AI744PE	Computer Security & Audit Assurance

Professional Elective – V/MOOCs

1	CY851PE/AI854PE	Quantum Computing
2	CY852PE	Data Analytics for Fraud Detection
3	CY853PE	5G Technologies
4	CY854PE/DS854PE	Devops

Professional Elective - VI

1	CY861PE	IoT Cloud Processing and Analytics
2	CY862PE	Security Incident & Response Management (SOC)
3	AI863PE	Semantic web and Social Networks
4	CY864PE	Quantum Cryptography

LIST OF OPEN ELECTIVE COURSES OFFERED BY CYBER SECURITY**Open Elective course –I**

S. No.	Course Code	Course Title
1.	CY611OE	Introduction to Cyber security
2.	CY612OE	Introduction to Cyber Law
3.	CY613OE	Fundamentals of Ethical Hacking

Open Elective course –II

S. No.	Course Code	Course Title
1.	CY721OE	Cryptography and Network Security
2.	CY722OE	Fundamentals of Databases Security
3.	CY723OE	Introduction to Cloud computing

Open Elective course –III

S. No.	Course Code	Course Title
1.	CY831OE	Introduction to Cloud Security
2.	CY832OE	Fundamentals of Cyber Forensics
3.	CY833OE	Network Programming

B.Tech. in COMPUTER SCIENCE AND ENGINEERING(CYBER SECURITY)**Choice Based Credit System (CBCS)- COURSE STRUCTURE REGULATIONS R-22****Applicable From 2022-23 Admitted Batch****I YEAR I SEMESTER**

S.No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Matrix Algebra and Differential Equations	3	1	0	4
2	AP102BS	Applied Physics	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EE104ES	Basic Electrical Engineering	3	0	0	3
5	IT105ES	IT Workshop Lab	0	0	3	1.5
6	AP106BS	Applied Physics Lab	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EE108ES	Basic Electrical Engineering Lab	0	0	2	1
9	EN109BS	Skill Development Course - I (Interchange - Business English)	0	0	2	1
10		Induction Programme				
		Total Credits	12	2	12	20

I YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Vector Calculus and Transforms	3	1	0	4
2	CH202BS	Engineering Chemistry	3	1	0	4
3	AI203ES	Data Structures Through C++	3	1	0	4
4	EN204HS	English for Skill Enhancement	2	0	0	2
5	ME205ES	Computer Aided Engineering Graphics Lab	0	0	3	1.5
6	CH206BS	Engineering Chemistry Lab	0	0	2	1
7	AI207ES	Data Structures Through C++ Lab	0	0	2	1
8	EN208HS	English Language and Communication Skills Lab	0	0	3	1.5
9	MA209HS	Skill Development Course - II (Aptitude and Logic Building)	0	0	2	1
		Total Credits	11	3	13	20

(MA101BS) MATRIX ALGEBRA AND DIFFERENTIAL EQUATIONS**I Year B.Tech. I Sem.****L T/ P/D C****3 1 /- /- 4****Course Objectives:** To learn

- Determine the rank of the matrix and applying this concept to solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Geometrical approach to the mean value theorems and their application to the mathematical problems.
- Partial differentiation Finding maxima and minima of function of two and three variables.
- Methods of solving the differential equations of first order and higher order.

Course Outcomes After learning the contents of this subject the student must be able to

- Solve the system of equations using matrices and interpret the rank of matrix using different methods.
- Apply the concept of Eigen values, Eigen vectors in Cayley Hamilton theorem and Quadratic forms.
- Examine the applications of Mean value theorems. Apply the concept of partial derivatives to find the extreme values of functions.
- Analyse the solutions of ODE of first order having first degree.
- Solve higher order differential equations.

UNIT-I:**Theory of 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 and Non-Homogeneous equations, Gauss elimination method, L-U decomposition method.

UNIT-II:**Eigen values and Eigen vectors**

Eigen values and Eigen vectors and their properties (without proof); Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III:**Mean value theorems & Partial Differentiation and applications**

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. (All theorems without

proof). Jacobian; Functional dependence and independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-IV:

First Order ODE

Exact differential equations, Equations reducible to exact differential equations, Linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-V:

Higher Order ODE

Second order linear differential equations with constant coefficients: non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, $e^{ax} \cos ax$, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$, $x^mV(x)$, $e^{ax}V(x)$, $x^mV(x)$; method of variation of parameters. Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

REFERENCES BOOKS:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

1st Year B.Tech I/I-Sem.

L	T	P	C
3	1	0	4

AP102BS: APPLIED PHYSICS**(Common for CSE, ECE, IT, CSM, CSD & CSC)****Course Objectives:**

The course primarily aims at understanding the behavior of matter in the condensed state and tries to explore the causes with reference to micro level mechanism of the solid matter.

- The objective of the first chapter is to study the micro level behavior of the quantum particles of the matter and assess the draw backs of the free electron theory leading to the introduction of the Band Theory of Solids.
- The second chapter focuses on the working principles and applications of basic semiconductor devices.
- In the third chapter task to discuss dielectric, magnetic properties of the materials and applications.
- In the fourth chapter plan to discuss on fabrication of nanoparticles and their characterization techniques.
- In the fifth chapter, it is expected to understand the basic principles behind the coherent artificial light source (LASER) with reference to their construction, mechanism, operation and classification etc. In second part of this chapter aimed at to study an advanced communication system presently ruling the world throughout i.e. Fiber Optic communication system.

Course Outcomes: After learning the contents of this paper the student must be able to

CO1: Predict the behavior of particle and wave and **solve** their wave functions.

CO2: Distinguish the different types of Semiconductor devices

CO3: Recall and **choose** different materials based on their properties.

CO4: Categorize Nano materials by fabrication methods.

CO5: Examine normal light and laser light and its **application** in communication.

UNIT - I: QUANTUM PHYSICS AND SOLIDS**10hrs**

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.

Solids: Symmetry in solids, free electron theory (Drude & Lorentz) Variation of Fermi level- with temperature - 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**10hrs**

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT) – structure, materials, working principle and characteristics: LED, PIN

diode, avalanche photo diode (APD) and solar cells.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

10hrs

Dielectric Materials: Basic definitions- types of polarizations (qualitative) – piezoelectric, ferroelectric and pyroelectric materials – applications – liquid crystal displays (LCD).

Magnetic Materials: Basic definitions- Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - memory devices, magnetic field sensors and multiferroics.

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

UNIT - IV: NANOTECHNOLOGY

10hrs

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

UNIT - V: LASER AND FIBER OPTICS

10hrs

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 fiber- advantages of optical Fibers - 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: medical, sensor and communication.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4 thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11th Edition, 2018.
3. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
4. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1stEdition, 2007.
5. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliksandr S. Bandarenka, CRC Press Taylor & Francis Group.
6. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

CS103ES PROGRAMMING FOR PROBLEM SOLVING**(Common for CSE, ECE, IT, CSM, CSD & CSC)****B.Tech. I Year I Sem.****L T P C****3 0 0 3****Course Objectives:**

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.

Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

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, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

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

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

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) Enu-

merationdata type

UNIT - III: Preprocessor and File handling in C:

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

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of 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
Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions
Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: 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

TEXT BOOKS:

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, 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. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

EE104ES: BASIC ELECTRICAL ENGINEERING (R-22)
(Common to CSC,CSM,CSD)

B.TECH I YEAR I/II SEM

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the concepts of electrical circuits and its components.
- To understand magnetic circuits, DC circuits and AC single phase and three phase circuits.
- To study and understand behaviour of transformers.
- To study and understand behaviour of DC machines.
- To study and understand behaviour of AC machines.

COURSE OUTCOMES:

CO1. Recall the basics of electric, magnetic and electromagnetic circuits.

CO2. Classify the types of machines and explain their working principles.

CO3. Explain the construction of DC and AC machines.

CO4. Analyze the characteristics of 1-Phase and 3-Phase machines.

CO5. Interpret different losses in the machines and determine their efficiency and regulation.

UNIT- I: D.C CIRCUITS

Electrical circuit elements (R,L,C), voltage and current sources, KVL & KCL, analysis of simple circuits with DC excitation. Superposition, Thevenin's and Norton's 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 circuit, voltage and current relations in star and delta connections.

UNIT-III: TRANSFORMERS

Ideal and practical transformers, equivalent circuits, losses in transformers, regulations and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: DC MACHINES

DC generators: Construction, working, emf equation and classification, DC motors: construction, working, back emf, torque equation, classification, characteristics, Loss components and efficiency.

UNIT-V: AC MACHINES

Generation of rotating magnetic fields , construction and working of a three-phase induction motor, significance of torque-slip characteristic, starting methods, Loss components and efficiency, construction and working of synchronous generators.

Suggested Text-Books/Reference-Books:

1. Basic electrical engineering -D. P. Kothari and I. J. Nagrath, 3rd edition 2010, Tata Mc Graw Hill.
2. D.C.Kulshreshtha, “ Basic electrical engineering”, Mc Graw Hill, 2009.
3. L.S. Bobrow , “ Fundamentals of electrical engineering” , oxford university press, 2011.
4. Electrical and Electronics Technology, E. Hughes, 10th edition, Pearson, 2010.
5. Electrical engineering fundamental, Vincent Deltoro, second edition, Prentice Hall India, 1989.

IT105ES/IT205ES IT Workshop**B.TECH I Year I/II Sem.****L T P C**
0 0 3 1.5

Course Objectives: The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

Course Outcomes:

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets

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 OS (Windows and Linux) on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Task 1: 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: 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 browser 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, 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.

REFERENCE BOOKS:

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

AP106BS: APPLIED PHYSICS LAB**(Common for CSE, ECE, IT, CSM, CSD & CSC)****B.TECH I Year I/II Sem.****L T P C**
0 0 3 1.5**Course Objectives:** The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

Course Outcomes:

1. Recalls the appropriate Principle, theory and formula for the experiment.
2. Choose the appropriate procedures and techniques for the different experiments.
3. Identify the different measuring devices and meters to record the data accurately.
4. Apply the mathematical concepts/equations to obtain results.
5. Analyze the experimental applications in real life by interpreting the results.

LIST OF EXPERIMENTS:

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. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of time constant of RC Circuit
11. a) Determination of the beam divergence of the given LASER beam
b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Understanding the method of least squares – torsional pendulum as an example.

Note: Any 8 experiments are to be performed.**REFERENCE BOOK:**

1. Applied Physics Lab Manual, CMREC, Hyd.
2. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

CS107ES PROGRAMMING FOR PROBLEM SOLVING LAB**B.Tech. I Year I Sem.****L T P C**
0 0 3 1.5

[Note: The programs may be executed using any available Open Source/ Freely available IDEs of the Tools available are:

CodeLite: <https://codelite.org/> Code:Blocks: <http://www.codeblocks.org/>

DevCpp : <http://www.bloodshed.net/devcpp.html> Eclipse: <http://www.eclipse.org>

This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

- a. 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.
- b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:

- a. Write a program for finding the max and min from the three numbers.
- b. Write the program for the simple, compound interest.
- c. Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
- d. Write a 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:

- e. $5 \times 1 = 5$
- f. $5 \times 2 = 10$
- g. $5 \times 3 = 15$
- h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

- a. 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 $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec ($= 0$) and acceleration in m/sec^2 ($= 9.8 \text{ m/s}^2$)).
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators $+$, $-$, $*$, $/$, $\%$ and use Switch Statement)
- c. Write a program that finds if a given number is a prime number
- d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- f. Write a C program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
- g. Write a C program to find the roots of a Quadratic equation.
- h. Write a C program to calculate the following, where x is a fractional value. $1 - \frac{x}{2} + \frac{x^2}{4} - \frac{x^3}{6}$
- j. Write a C program to read in two numbers, x and n , and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$.

Arrays, Pointers and Functions:

- a. Write a C program to find the minimum, maximum and average in an array of integers.
- b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
- c. Write a C program that uses functions to perform the following:
 - d. Addition of Two Matrices
 - e. Multiplication of Two Matrices
 - f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
 - g. Write C programs that use both recursive and non-recursive functions
 - h. To find the factorial of a given integer.
 - i. To find the GCD (greatest common divisor) of two given integers.
 - j. To find x^n
 - k. Write a program for reading elements using a pointer into an array and display the values using the array.
 - l. Write a program for display values reverse order from an array using a pointer.

Sorting and Searching:

- a. Write a C program that uses non recursive function to search for a Key value in a given
- b. list of integers using linear search method.
- c. Write a C program that uses non recursive function to search for a Key value in a given
- d. sorted list of integers using binary search method.
- e. Write a C program that implements the Bubble sort method to sort a given list of
- f. integers in ascending order.
- g. Write a C program that sorts the given array of integers using selection sort in descending order
- h. Write a C program that sorts the given array of integers using insertion sort in ascending order
- i. Write a C program that sorts a given array of names

TEXT BOOKS:

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

EE108ES: BASIC ELECTRICAL ENGINEERING LAB (R-22)
(Common to CSM/CSD/CSC)

B. Tech I Year I Sem

L T P C
0 0 2 1

Course objectives:

- To analyze a given network by applying various electrical laws and network theorems.
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines.

Course Outcomes:

CO1. Verify basic electrical laws and network theorems.

CO2. Analyze the transient responses of R, L and C circuits for different input conditions.

CO3. Understand the measurement, calculation and relation between the basic electrical parameters.

CO4. Evaluate the basic characteristics of transformers and electrical machines through various testing methods.

List of experiments/demonstrations:

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient Response of Series RL, RC and RLC circuits using DC excitation.
4. Verification of Thevenin's and Norton's theorems.
5. Verification of Superposition theorem.
6. Resonance in series RLC circuit.
7. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
11. Performance Characteristics of DC Shunt Motor.
12. Performance Characteristics of a Three-phase Induction Motor.
13. No-Load Characteristics of a Three-phase Alternator

INTERCHANGE - BUSINESS ENGLISH
(Common for CSE, ECE, IT, CSM, CSD & CSC)
COURSE CODE: SD109EN/SD209EN

B.Tech I Year I/I Sem.

L/T/P/C

0/0 /2/1

Introduction:

The rapid break down of national barriers over the last decade has resulted in English language skills acquiring a great deal of importance in business sector. In a world with ever-growing levels of globalization and inter connectivity, the significance of English increased rapidly. But lack of exposure towards English Communication is a serious handicap for any aspirants. By recognizing this, the institution has focused to train the Engineering Students in Business Communication through “**Interchange**”. Interchange is a multi-skills English module Course that has been used by over 50 million students worldwide. It has been introduced in B.Tech first year to prepare the students to get the advantage when enter the job world. In today’s globalization, it is more significant to show employers that you can communicate in English effectively in every-day business circumstances.

Course Objectives:

- The trusted methodology and proven approach help the students to learn English.
- To train the students to qualify the Interchange examination.
- Develop study skills and communication skills in formal and informal situations.
- The clear communicative approach delivers results and helps students become confident speakers of English right from the beginning.

Course Outcomes: Students should be able to

CO-1: Use English Language effectively in spoken and written forms.

CO-2: Comprehend the given texts and respond appropriately.

CO-3: Communicate confidently and clearly in various contexts or different situations.

UNIT I

- **Pronunciation:** Linked sounds -- Stress with compound nouns -- listening to the Descriptions.
- **Grammar:** Relative pronouns -- Gerunds and Noun Phrases.
- **Speaking:** Describing personalities -- Talking about possible careers and deciding between two jobs.
- **Reading /Writing:** Reading about unusual social networking sites and different types of workplaces -- Writing a description about of a good friend and about two career choices.

UNIT II

- **Pronunciation:** Unreleased consonants and Intonation in Complex sentence -- listening to people for New stories and Information about living aboard.
- **Grammar:** Requesting with Modals -- If clauses -- Past tense forms.
- **Speaking:** Making formal and informal requests – messages -- Narrating a story and talking about expanding your horizons.

- **Reading /Writing:** Reading about the life reliability of online content -- moving to another country and problem with ride sharing--Writing a personal account-- pamphlet for tourists and critical online review.

UNIT III

- **Pronunciation:** Contrastive stress -- Auxiliary Verbs reduction--Listening for Solution-- Additional information-- New year's Resolution.
- **Grammar:** Prepositions of cause --Phases and present tenses forms.
- **Speaking:** Identifying and describing Problems -- Coming up with solutions -- Learner choices and Learning methods and life skills.
- **Reading /Writing:** Reading about a creative solution, Different Studying style, Futuristic and their Predications for the year 2050 -- Writing about a skill-- Message of Advice and Biography.

UNIT IV

- **Pronunciation:** Sentence stress -- reduction of have and been words and past modals.
- **Grammar:** Future tense forms -- Time clauses and Infinitive clauses.
- **Speaking:** Talkingabout things done -- Historic events and things to be accomplished in the future.
- **Reading /Writing:** Reading about conflict with a friend-- what makes some Advertisement memorable? --Writing a message of Apology--Wed commercial about a complicated situation.

UNIT V

- **Pronunciation:** Review of Stress in Compound nouns-- Intonation in Question Tags-- listening for parts of Movie and find solutions to everyday annoyances.
- **Grammar:** Passive voice and Relative Clause.
- **Speaking:** Describing qualities for Success -- Interviewing for a job-- Drawing conclusion-- Giving Opinions for and against Controversial topics.
- **Reading /Writing:** Reading about Unexplained events -- Plagiarism in the digital Age -- Writing about complicated situations -- process and Persuasive Essay-- Writing a Personal statement for an Application.

Prescribed Textbooks:

- Jack C. Richards & Jonathan Hull and Susan proctor (2017) "Interchange Book-2 Fifth Edition" by Cambridge University Press.
- Jack C. Richards & Jonathan Hull and Susan proctor (2017) "Interchange Book-3 Fifth Edition" by Cambridge University Press.

Website links:

- <http://www.cambridge.org>
- <http://www.learnenglish.com>
- <http://www.eslgames.com>
- <https://www.cambridgeenglish.org/supporting-teachers/>
- https://britishcouncil.zoom.us/webinar/register/WN_Ddm6jFvxTpWAFyWWeZzX_Q
- <https://www.cambridge.org/gb/education/elevate-trial/>
- <https://learnenglishteens.britishcouncil.org/skills/listening>

(MA201BS) VECTOR CALCULUS AND TRANSFORMS**I Year B.Tech. II Sem.****L/T/P/C****3/1/-/4****Course Objectives:** To learn

- Concept, properties of Laplace transform and solving ordinary differential equations using Laplace transforms techniques.
- Evaluation of double integrals. Evaluation of improper integrals using Beta and Gamma functions.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes: After learning the contents of this subject the student must be able to

- Find the Laplace transforms for given functions.
- Apply the Laplace transforms techniques for solving ODE.
- Solve the double integrals and evaluate the improper integrals using Beta and Gamma functions.
- Determine gradient, divergent and curl by using vector differentiation.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: LAPLACE TRANSFORMS

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

UNIT- II: INVERSE LAPLACE TRANSFORMS

Inverse Laplace transform by different methods, convolution theorem (without proof), solving ODEs by Laplace Transform method.

UNIT-III: BETA AND GAMMA FUNCTIONS AND DOUBLE INTEGRATION

Beta and Gamma Functions, their properties, evaluation of improper integral using Beta and Gamma Functions. Evaluation of Double Integrals (Cartesian and polar coordinates); Change of order of integration (only Cartesian form); Change of variables.

UNIT-IV: VECTOR DIFFERENTIATION

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

UNIT-V: VECTOR INTEGRATION

Line, Surface and Volume Integrals. Vector integral theorems: Green's, Gauss divergence and Stoke's (without proof) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. B.V. Ramana, A text Book of Engineering Mathematics, Tata Mc Graw Hill.

REFERENCES:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. S.R.K. Iyengar and R. K. Jain, Advanced Engineering Mathematics, Narosa Publication.

I Year B.Tech. II Sem.**L T/ P/D C****3 /- /- 3****(CH-102-BS/CH-202-BS) ENGINEERING CHEMISTRY****Course Objectives:**

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry and water treatment which are essential for the Engineers and in industry.
- To identify the type of corrosion and apply various principles for its preventions which are essential for an engineer in industry
- To impart the basic knowledge about solid fuel- coal, liquid fuels- petroleum, kerosene oil and diesel, gaseous fuels – LPG, natural gas their origin, classification, calorific value and its determination.

Course Outcomes:

- The basic concepts included in this course will help the student to gain:
- The knowledge of the physical & chemical parameters of quality of water and explain the process of water treatment
- The knowledge to analyze atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, batteries, polymers and their applications
- Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.

UNIT-I

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, Chlorination and Break point Chlorination, ozonization. Boiler Troubles-Scales and sludges, Caustic embrittlement, Priming and foaming, Boiler corrosion. Internal conditioning methods - Phosphate, Carbonate, Calgon and Colloidal conditioning. External conditioning method- Ion exchange method.Desalination of Brackish Water- Reverse Osmosis and Electro dialysis

UNIT-II

Energy Sources: Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula (Numerical problem).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 III

Electrochemistry & Batteries: Electrochemistry: Introduction, Electrode potential, Standard electrode potential, Electrochemical series and its applications. Electrochemical cell, E.M.F of the cell, Nernst equation- derivation and applications- Determination of EMF, Determination of Equilibrium constant Numerical problems. Types of electrodes- Construction and working and determination of pH using Calomel electrode, Quinhydrone electrode and Glass electrode. Batteries: Construction and working of primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery). Fuel cells: Construction, working and application of H₂-O₂ and methanol-oxygen fuel cells. Introduction to Solar cells and its applications

UNIT IV

Corrosion and its Control: Introduction, Definition, Causes and effects of corrosion. Theories of chemical and electrochemical corrosion. 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.

UNIT V

Engineering Materials and Corrosion: Polymers: Types of polymerizations (addition, condensation and copolymerization). Mechanism of Free radical Addition polymerization. Plastics: Thermoplastic and Thermosetting resins. Preparation, Properties and engineering applications of PVC, Bakelite, Teflon Fibre Reinforced Plastics (FRP) – applications. Rubbers: Natural rubber and its vulcanization. Bio-degradable polymers- preparation and applications of Polyvinyl acetate. Conducting polymers- Characteristics and Classification with examples- mechanism of conduction in trans polyacetylene and applications of conducting polymers. **Smart materials-** Introduction, classification and their engineering applications- Shape memory materials- Poly L- Lactic acid.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi and Rath, Cengage learning 2nd Edition 2022.
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCES BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015).
2. Text book of Engineering Chemistry by S.S. Dara, S Chand Publications 2022

**AI203ES: DATA STRUCTURES THROUGH C++
Common to CSM, CSD, and CSC****B.Tech. I Year II Sem.****L T P C
3 0 0 3****Prerequisites:** Programming for Problem Solving**Course Objectives:**

- To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the notations used to analyze the Performance of algorithms.
- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
- To choose an appropriate data structure for a specified application.
- To understand and analyze various searching and sorting algorithms.
- To learn to implement ADTs such as lists, stacks, queues, trees, graphs, search trees in C++ to solve problems.

Course Outcomes:

- Ability to choose appropriate data structures to represent data items in real world problems.
- Ability to analyze the time and space complexities of algorithms.
- Ability to design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
- Able to analyze and implement various kinds of searching and sorting techniques.

UNIT - I

C++ Programming Concepts: Review of C, input and output in C++, functions in C++- value parameters, reference parameters, Parameter passing, function overloading, function templates, Exceptions-throwing an exception and handling an exception, arrays, pointers, new and delete operators, class and object, access specifiers, friend functions, constructors and destructor, Operator overloading, class templates, Inheritance and Polymorphism.

Basic Concepts - Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

UNIT - II

Representation of single, two dimensional arrays, sparse matrices-array and linked representations. Linear list ADT-array representation and linked representation, Singly Linked Lists- Operations- Insertion, Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

Stack ADT, definition, array and linked implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked Implementations, Circular queues-Insertion and deletion operations.

UNIT - III

Trees – definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, Threaded binary trees, Priority Queues –Definition and applications, Max Priority Queue ADT-implementation- Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

UNIT - IV

Searching - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

Sorting- Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.

UNIT - V

Graphs–Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis,

Search Trees-Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees- Definition and Examples only, Red-Black Trees-Definitions and Examples only, Comparison of Search Trees.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, 2nd Edition, Sartaj Sahni, Universities Press.
2. Data structures and Algorithms in C++, Adam Drozdek, 4th edition, Cengage learning.

REFERENCE BOOKS:

1. Data structures with C++, J. Hubbard, Schaum's outlines, TMH.
2. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
3. Data structures and Algorithm Analysis in C++, 3rd edition, M. A. Weiss, Pearson.
4. Classic Data Structures, D. Samanta, 2nd edition, PHI.

ENGLISH FOR SKILL ENHANCEMENT
(Common for CSE, ECE, IT, CSM, CSD & CSC)
COURSE CODE: EN104HS/EN204HS

B.Tech. I Year I/ II Sem.

L / T / P / C
2 / 0 / 0 / 2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of “English for Skill Enhancement” has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing.

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

CO-1: Choose appropriate vocabulary and sentence structures for their oral and written communication.

CO-2: Demonstrate their understanding of the rules of functional grammar.

CO-3: Develop comprehension skills from the known and unknown passages.

CO-4: Take an active part in drafting paragraphs, letters, essays, description and reports in various contexts.

CO-5: Acquire basic proficiency in reading and writing of English.

UNIT-I

Chapter entitled ‘**Toasted English**’ by **R.K.Narayan** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes- 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 -Importance of Proper Punctuation- Paragraph writing – Types, 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 BlackSwan, 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.

Writing: Defining-Describing People, Objects, Places and Events.

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 BlackSwan, Hyderabad.

Vocabulary: Words Often Confused- Idioms and Phrases.

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

Reading: Sub-Skills of Reading -Intensive Reading and Extensive Reading.

Writing: Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, and Job Application with CV/Resume.

UNIT –IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English.

Grammar: Redundancies in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method).

Writing: Essay Writing and Précis Writing.

UNIT –V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their usage

Grammar: Error identification.

Reading: Techniques for Reading Comprehension.

Writing: Technical Reports- Characteristics of a Report - Structure of Reports (Manuscript Format) and Advertisement making.

TEXT BOOK:

1. “English: Language, Context and Culture” by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1, 2, 3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.). Sage Publications India Pvt. Ltd.
5. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
6. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

ME105ES: COMPUTER AIDED ENGINEERING GRAPHICS LAB**(Common for all Branches, Sem-II: CSC, CSD, CSM)****B.Tech. I Year: I Sem/ II Sem.**

Pre-requisites: Nil

Course Objectives:

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

Course Outcomes: At the end of the course, the student will be able to:

- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting.

UNIT — I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales — Plain & Diagonal, Conic Sections including the Rectangular Hyperbola — General method only Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting — views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections — Conventions — Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections — points, lines and planes

UNIT — III:

Projections of Regular Solids -- Auxiliary Views - Sections or Sectional views of Right Regular Solids — Prism, Cylinder, Pyramid, Cone — Auxiliary views, Computer aided projections of solids — sectional views

UNIT — IV:

Development of Surfaces of Right Regular Solids — Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT — V:

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. Conversion of Isometric Views to Orthographic Views and Vice-versa — Conventions. Conversion of orthographic

projection into isometric view using computer aided drafting.

TEXT BOOKS:

1. Engineering drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapooan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGrawHill
2. Engineering Graphics and Design, WILEY, Edition2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Dra.v.ng — K Balaveera Reddy et al — CBS Publishers

Note: Both Internal as well as External examinations are conducted using Computer Aided Drafting.

(CH-106BS/CH-206BS) Engineering Chemistry Lab**I Year B.Tech. I/II Sem.****L T P C**
- / - / 3 1.5**LIST OF EXPERIMENTS: (PERFORM ANY 10 EXPERIMENTS)****Volumetric Analysis:****Experiment No. 1:** Estimation of Hardness of water by EDTA Complexometry method**Conductometry:****Experiment No 2:** Determination of the concentration of strong acid HCl by Conductometry**Experiment No 3:** 3.Determination of the concentration of weak acid CH₃COOH by Conductometry**Potentiometry:****Experiment No 4:** Estimation of Ferrous iron by Potentiometry using dichromate**Experiment No 5:** Estimation of the amount of strong acid HCl by potentiometry.**pH Metry:****Experiment No 6:** Determination of strong acid concentration using pH meter**Preparation:****Experiment No 7:** Preparation of Bakelite.**Experiment No 8:** Preparation Nylon 6,6**Viscosity**

9. Determination of viscosity of lubricant by using Ostwald Viscometer

Preparation

10. Preparation of Hand Sanitizer

Virtual Lab experiments

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications.
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

TEXT BOOKS

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
3. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

AI207ES: DATA STRUCTURES THROUGH C++ LAB
Common to CSM, CSD, AND CSC**B.Tech. I Year II Sem.****L T P C**
0 0 3 1.5**Prerequisites:** A Course on “Programming for problem solving”.**Course Objectives:**

- To write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.
- To learn to write C++ programs to implement various sorting and searching algorithms.

Course Outcomes:

- Able to identify the appropriate data structures and algorithms for solving real world problems.
- Able to implement various kinds of searching and sorting techniques.
- Able to implement data structures such as stacks, queues, Search trees, and hash tables to solve various computing problems.

List of Experiments

1. Write a C++ program that uses functions to perform the following:
 - a) Create a singly linked list of integers.
 - b) Delete a given integer from the above linked list.
 - c) Display the contents of the above list after deletion.
2. Write a template-based C++ program that uses functions to perform the following:
 - a) Create a doubly linked list of elements.
 - b) Delete a given element from the above doubly linked list.
 - c) Display the contents of the above list after deletion.
3. Write a C++ program that uses stack operations to convert a given infix expression into its postfix equivalent, Implement the stack using an array.
4. Write a C++ program to implement a double ended queue ADT using an array, using a doubly linked list.
5. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of characters.
 - b) Traverse the above Binary search tree recursively in preorder, in order and post order,
6. Write a C++ program that uses function templates to perform the following:
 - a) Search for a key element in a list of elements using linear search.
 - b) Search for a key element in a list of sorted elements using binary search.
7. Write a template-based C++ program that implements Quick sort algorithm to arrange a list of elements in ascending order.
8. Write a C++ program that implements Heap sort algorithm for sorting a list of integers in as-

ending order.

9. Write a C++ program that implements Merge sort algorithm for sorting a list of integers in ascending order
10. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.
11. Write a C++ program that implements Radix sort algorithm for sorting a list of integers in ascending order
12. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of integers.
 - b) Traverse the above Binary search tree non-recursively in inorder.
13. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of integers.
 - b) Search for an integer key in the above binary search tree non-recursively.
 - c) Search for an integer key in the above binary search tree recursively.

REFERENCE BOOKS

1. Data Structures using C++, D. S. Malik, 2nd edition, Cengage learning.
2. Data Structures using C++, V. Patil, Oxford University Press.
3. Fundamentals of Data structures in C++, 2nd edition, E. Horowitz, S. Sahni and D. Mehta, Universities Press.
4. C++ Plus Data Structures, 4th edition, Nell Dale, Jones and Bartlett student edition.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (R22)**(Common for CSE, ECE, IT, CSM, CSD & CSC)****COURSE CODE: EN108HS/EN208HS****B.TECH. I YEAR I/ISEM****L/T/P/C****0/0/3/1.5****INTRODUCTION:**

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.

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact of dialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

COURSE OUTCOMES: Students will be able to:

CO1: Use English with proper pronunciation.

CO2: Describe the persons, places, objects and events.

CO3: Choose appropriate vocabulary for oral and written communication.

CO4: Develop speaking skills with clarity and confidence.

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Exercise – I**CALL Lab:**

Listening Skill- Its importance-Types-Barriers-Effective Listening.

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

ICS Lab:

Ice-Breaking Activity and JAM Session.

Exercise – II

CALL Lab: Structure of Syllables - Word Stress - Weak Forms and Strong Forms –Intonation.

ICS Lab: Features of Good Conversation- Situational Dialogues – Role Play- Expressions in Various Situations –Telephone Etiquette.

Exercise - III

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

ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing.

Exercise – IV

CALL Lab: Listening for General Details - Listening Comprehension.

ICS Lab: Non-verbal Communication- Making a Short Speech -Extempore- Power Point Presentation.

Exercise – V

CALL Lab: Listening for Specific Details - Listening Comprehension.

ICS Lab: Debate and 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 40 students with 40 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 audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

- Oxford Advanced Learner’s Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University

Press.

- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills-Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
3. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt. Ltd.
4. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press

**MA209HS: SKILL DEVELOPMENT COURSE
(APTITUDE AND LOGIC BUILDING)**

I Year B.Tech. I/II Sem.

**L/T/P/C
0/0/2/1**

Course Objectives:

- To enhance the problem-solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations..

Course Outcomes: After learning the contents of this subject the student must be able to

- Evaluate the problems on Percentage, profit and loss.
- Solve the problems given on Partnerships and simple and compound interest.
- Evaluate the problems on Time & Work, Pipes & Cisterns, Boats & Streams.
- Determine the solutions for the problems based on Time & Distance, Trains.
- Interpret the diagrams and solve the questions related to clocks and calendar.

Unit-I: Percentages and Profit & Loss

Percentages: Percentage difference, Percentage increase & decrease, fraction to Percentage, Percentage vs per cent.

Profit & Loss: Cost price, selling price, percentages of profit & loss.

Unit-II: Partnerships and Simple & Compound interest

Partnerships: definition, Ratio of division of gains, working and sleeping partners.

Simple & Compound interest: Principal amount, time & rate of interest.

Unit-III: Time & Work, Pipes & Cisterns and Boats & Streams

Time & Work: Introduction, time & work by using fractions and percentages.

Pipes & Cisterns: Inlet, Outlet, time to emptying & filling a tank.

Boats & Streams: Upstream, downstream, still water, stream related problems, average speed, distance, speed when time is given.

Unit-IV: Time & Distance and Trains

Time & Distance: Time, Speed, Average and Distance related problems.

Trains: Pass a point, Stationary object of length, moving objects same & opposite directions.

Unit-V: Clocks and Calendars

Clocks: Introduction, minute space, minute & hour hands angle between hands.

Calenders: Odd & Even day, week, leap & Ordinary year, century.

TEXTBOOK:

1. Quantitative aptitude by Dr.R.S. Agarwal, S.Chand publications.
2. Verbal and Non-Verbal Reasoning by Dr.R.S.Agarwal.

REFERENCES:

1. Fast track Objective Arithmetic by Rajesh verma – Arihant Publications: fourth edition (2018).
2. Quantitative aptitude for all Competitive Examinations by Abhijith Guha – McGraw Hill Education: sixth edition (2016).

B.Tech. in COMPUTER SCIENCE AND ENGINEERING(CYBER SECURITY)
Choice Based Credit System (CBCS)-COURSE STRUCTURE REGULATIONS-22
Applicable From 2022-23 Admitted Batch

II YEAR I SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	CS301PC	Database Management Systems	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	0	0	3
3	CS303PC	Operating Systems	3	0	0	3
4	CS304PC	Object Oriented Programming through Java	3	0	0	3
5	MA305BS	Computer Oriented Statistical Methods	3	1	0	4
6	CS306PC	Database Management Systems Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	2	1
8	CS308PC	Java Programming Lab	0	0	2	1
9	SD309PC	Skill Development Course-III (Data visualization- R Programming/ Power BI)	0	0	2	1
10	*MC311	Gender Sensitization Lab	0	0	2	0
Total Credits			15	1	10	20

II YEAR II SEMESTER

S.No.	CourseCode	Course Title	L	T	P	Credits
1	CY401PC	Cryptography and Network Security	3	0	0	3
2	IT402PC	Discrete Mathematics	3	0	0	3
3	EC403ES	Analog and Digital Electronics	3	0	0	3
4	AI404PC	Design and Analysis of Algorithms	3	1	0	4
5	CS405PC	Software Engineering	3	0	0	3
6	EC406ES	Analog and Digital Electronics Lab	0	0	2	1
7	CS407PC	Cryptography and Network Security Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real-time Research Project/ Field Based Project	0	0	2	1
10	SD410PC	Skill Development Course-IV (Node JS/ React JS/ Django)	0	0	2	1
11	MC412	Environmental Science	2	0	0	0
Total Credits			17	1	10	21

***MC – Satisfied/Unsatisfied**

CMR ENGINEERING COLLEGE, HYDERABAD**B.TECH II Year I Sem.****L T P C****3 0 0 3****CS301PC: DATABASE MANAGEMENT SYSTEMS****Prerequisites:** A course on "Data Structures.**Course Objectives:**

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

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 data base 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 data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued 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, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc GrawHill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, Vedition.

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
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. Gillenson, Wiley Studen tEdition.

COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) 2022-23**B.TECH II Year I Sem.****L T P C****3 0 0 3****CS302PC: COMPUTER ORGANIZATION AND ARCHITECTURE****Pre-requisite:** A Course on “Digital Logic Design and Microprocessors”.**Course Objectives:**

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes:

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

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, multiplication Algorithms, 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.

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, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOK:

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

REFERENCES:

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

B.TECH II Year I Sem.**L T P C**
3 0 0 3**CS303PC: OPERATING SYSTEMS****Prerequisites:**

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

Course Objectives:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

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 **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, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7thEdition,- 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.

B.TECH II Year I Sem.**L T P C**
3 0 0 3**CS304PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA****Course Objectives**

- To Understand the basic object-oriented programming concepts and apply them in problem solving.
- To Illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling
- To Develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming

Course Outcomes

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

UNIT - I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop 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. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

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

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border,grid, flow, card and grid bag.

UNIT - V

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrameand JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes,Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Java the complete reference, 7th edition, Herbert schildt, 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, eighthEdition,Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighthEdition,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'sBeginning Java2 JDK 5, SPD.

B.TECH II Year I Sem.**L T P C**
3 1 0 4**MA305BS: COMPUTER ORIENTED STATISTICAL METHODS****Common to IT, CSD, CSC****Course Objectives:** To learn

- Concepts of the probability, types of random variables and probability distributions.
- Sampling distributions and their properties, concepts on estimation.
- Concepts on testing the hypothesis concerning to large samples.
- Different kinds of tests related to small samples and tests concerned to small size.
- Samples and goodness of fit and independence of attributes using chi-squaredistribution.
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of the subject the student must be able to

- Understand the concepts of random variables.
- Discuss various probability distributions and Sampling Distributions.
- Test the hypothesis related to samples concerning to the means and proportions of large size samples.
- Analyze the nature of hypothesis by using various tests for small samples.
- Solve the Markov chains in stochastic processes.

UNIT-I: Random Variables

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's theorem and problems.

Random variables: Discrete and Continuous random variables, Probability Mass and Density functions, Expectation and Variance.

UNIT-II: Probability Distributions

Binomial, Poisson and Normal Distributions. Populations and Samples, Sampling distribution of the Mean (σ - known and unknown), Central limit theorem.

UNIT-III: Estimation and Tests of Hypothesis for Large Samples

Estimation: Point Estimation and Interval Estimation concerning Means for Large Samples.

Tests of Hypothesis: Type-I and Type-II Errors, Hypothesis testing concerning single mean and difference of means and tests of hypothesis concerning to single proportion and difference of proportions.

UNIT-IV: Tests of Hypothesis for Small Samples

Student t-test, Hypothesis testing concerning one mean and two means, F-test and χ^2 test, Goodness of fit, Independence of Attributes.

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.

Text Books:

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
- S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

Reference Books:

- Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
- Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.

B.TECH II Year I Sem.**L T P C**
0 0 2 1**CS306PC: DATABASE MANAGEMENT SYSTEMS LAB****Co-requisites:**

- Co-requisite of course “Database Management Systems”

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rdEdition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, Vedition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
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. Gillenson, *Wiley Student Edition*.

B.TECH II Year I Sem.**L T P C**
0 0 2 1**CS307PC: OPERATING SYSTEMS LAB (Using UNIX/LINUX)**

Prerequisites: A course on “Programming for Problem Solving”, A course on “Computer Organization and Architecture”.

Co-requisite: A course on “Operating Systems”.

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess-communication and I/O in Unix

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms
a) FCFS b) SJF c) RoundRobin d) priority
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 a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
a) Paging b) Segmentation
7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

TEXT BOOKS:

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

B.TECH II Year I Sem**L T P C**
0 0 2 1**CS308PC: JAVA PROGRAMMING LAB****Course Objectives:**

- To write programs using abstract classes.
- To write programs for solving real world problems using the java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands-on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using the java collection framework.
 - Able to write programs using abstract classes.
 - Able to write multithreaded programs.
 - Able to write GUI programs using swing controls in Java.
1. Use LINUX and MySQL 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 various menus. 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 small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. 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.
3. 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.
4. 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.
5. 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.

6. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.
7. 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.
8. 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 print Area () that prints the area of the given shape.
9. 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.
10. 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).
11. 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 are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.
13. Write a Java program to list all the files in a directory including the files present in all its sub-directories.

REFERENCE BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

B.TECH II Year I Sem.**L T P C**
0 0 2 1**SD309PC: Skill Development Course (Data Visualization-R Programming/Power Bi)****Course Objectives:**

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcomes: At the end of the course a student should be able to

- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations.
- Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:

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, AVG, 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.

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.

B.TECH II Year I Sem.**L T P C**
0 0 2 0***MC311: GENDER SENSITIZATION LAB (An Activity-based Course)****COURSE DESCRIPTION**

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

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

Learning Outcomes

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

UNIT - I: UNDERSTANDING GENDER

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 Out Is 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.

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

- **Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.**
- **ESSENTIAL READING:** The Textbook, “*Towards a World of Equals: A Bilingual Textbook on Gender*” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharupublished by **Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING

- Discussion & Classroom Participation:20%
- Project/Assignment:30%
- End Term Exam:50%

II Year B.Tech II-Sem**L T P C****3 0 0 3****CY401PC: CRYPTOGRAPHY AND NETWORK SECURITY****Pre-Requisites:**

- Calculus and basic linear algebra
- Probability and number theory

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

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.

TEXT BOOKS:

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

B.TECH II Year II Sem.**L T P C**
3 0 0 3**IT402PC: DISCRETE MATHEMATICS****Course Objectives:**

- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:

- Understand and construct precise mathematical proofs
- Apply logic and set theory to formulate precise statements
- Analyze and solve counting problems on finite and discrete structures
- Describe and manipulate sequences
- Apply graph theory in solving computing problems

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-Color Problem.

TEXT BOOKS:

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 I. Mott, AbrahamKandel,- Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

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

B.TECH II Year II Sem.**L T P C****3 0 0 3****EC403ES: ANALOG AND DIGITAL ELECTRONICS****Course Objectives:**

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

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

- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Learn Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Know about the logic families and realization of logic gates.

UNIT - I

Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, Tunnel diodes, photo diode, LED.

Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II

BJTs: Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias or Emitter bias, bias compensation, thermal runaway and stability, transistor at low frequencies, CE amplifier response, gain bandwidth product, Emitter follower, RC coupled amplifier, two cascaded CE and multi stage CE amplifiers.

UNIT - III

FETs and Digital Circuits: FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers, CS and CD amplifiers.

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT - IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS:

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, ChristosHalkias and Chethan D. Parikh, Tata McGraw-Hill Education, India,2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson,2011.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series,1988.
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series,1994.

B.TECH II Year II Sem.**L T P C****3 1 0 4****AI404PC: DESIGN AND ANALYSIS OF ALGORITHMS****Prerequisites:**

- **A course on “Computer Programming and Data Structures”**
- **A course on “Advanced Data Structures”**

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a specified application
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

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

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

UNIT – III

Dynamic Programming: General method, applications- Optimal binary search trees, 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.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsackproblem - 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.

TEXT BOOK:

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 RTamassia, John Wiley and sons.

B.Tech II Year II-Sem**L T P C**
3 0 0 3**CS405PC: SOFTWARE ENGINEERING****Course Objectives**

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams.

Course Outcomes

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

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.

TEXT BOOKS:

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 Rumbaugh, 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.

B.TECH II Year II Sem.**L T P C**
0 0 2 1**EC406ES: ANALOG AND DIGITAL ELECTRONICS LAB****Course Objectives**

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

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

- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Full Wave Rectifier with & without filters
2. Common Emitter Amplifier Characteristics
3. Common Base Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Input and Output characteristics of FET in CS configuration
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder /Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc

B.TECH II Year II Sem.**L T P C**
0 0 2 1**CY407PC:CRYPTOGRAPHY AND NETWORK SECURITY LAB****List of Experiments:**

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

B.Tech. II Year II-Sem**L T P C**
0 0 2 1**CS408PC: SOFTWARE ENGINEERING LAB****Prerequisites**

- A course on “Programming for Problem Solving”

Co-requisite

- A Course on “Software Engineering”

Course Objectives:

- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:

- Ability to translate end-user requirements into system and software requirements
- Ability to generate a high-level design of the system from the software requirements
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

List of Experiments

1. Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:
2. Development of problem statement.
3. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
4. Preparation of Software Configuration Management and Risk Management related documents.
5. Study and usage of any Design phase CASE tool.
6. Performing the Design by using any Design phase CASE tools.
7. Develop test cases for unit testing and integration testing.
8. Develop test cases for various white box and black box testing techniques.

Sample Projects:

- Passport automation System
- Book Bank
- Online Exam Registration
- Stock Maintenance System
- Online course reservation system
- E-ticketing
- Software Personnel Management System
- Credit Card Processing

- E-book management System.
- Recruitment system

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc GrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

CS409PC: Real-Time Research Project/Field-Based Research Projects
(Common to CSE, IT, CSM, CSD and CSC Branches)

B.Tech. II Year II Sem

L T P C
0 0 2 1

The guidelines will be followed as laid down by JNTUH

B.TECH II Year II Sem.**L T P C**
0 0 2 1**SD410PC: Skill Development Course (NODE JS/ REACT JS/ DJANGO)****Prerequisites:** Object Oriented Programming through Java, HTML Basics**Course Objectives:**

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

Course Outcomes:

At the end of the course, the student will be able to,

- Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- Demonstrate Advanced features of JavaScript and learn about JDBC
- Develop Server – side implementation using Java technologies like
- Develop the server – side implementation using Node JS.
- Design a Single Page Application using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session-tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)

11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js
14. Create a TODO application in react with necessary components and deploy it into github.

REFERENCE BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasam Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press

B.TECH II Year II Sem.**L T P C**
2 0 0 0***MC412:ENVIRONMENTAL SCIENCE****Course Objectives:**

- S – skills (Acquire the skills for identifying and solving environmental problems)
- P – protection qualities(participate in improvement and protection of the environment)
- E – evaluation abilities(develop the ability to evaluate measures for the protection of environment)
- A – attitude (acquire an attitude of concern for the development)
- K – knowledge (gain knowledge about the environment and its allied problems)

Course Outcomes:

Based on this course, the Engineering graduate will

- **Define** basic definitions and can explain complex relationship between predators, prey and the plantcommunity.
- **Categorize** resources in natural environment and its relationships with human activities as well as human impacts.
- **Demonstrate** an awareness, knowledge and appreciation of the intrinsic values of ecological processes and communities
- **Assess** different scientific research strategies, including collection, management, evaluation and interpretation of environmental data and role of Information technology in environment
- **Examine** the transnational character of environmental problems, protection acts and ways of addressing them, including interactions across local to global scales

UNIT-I :

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem-Food chains, food webs and ecological pyramids. Flow of energy, biogeochemical cycles, bioaccumulation, biomagnifications, ecosystem value, services and carrying capacity.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources.

UNIT-III:

Biodiversity and biotic resources: Introduction, definition, genetic, species and ecosystem diversity. Values of biodiversity- consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity.. Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, automobile and industrial pollution,

Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e- waste and its management. Pollution control technologies: Wastewater treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global environmental problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and ozone depleting substances (ODS). International conventions / Protocols: Earth summit, Kyoto protocol and Montréal protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable future: Concept of sustainable development, population and its explosion, Crazy Consumerism, Environmental education, Urban sprawl, Human health, Environmental ethics, Concept of green building, Ecological foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental studies by Anubha Kaushik and C.P.Kaushik

REFERENCE BOOKS:

1. Environmental Studies –From crisis to cure by Dr. R. Rajagopaln
2. Text book for Environmental science and Technology by M. Anji Reddy
3. Environmental engineering and Disaster management by KR.Chandoke
4. Environmental engineering and science- Third edition by Gilbert M.Masters and Wendell P.Ella
5. Environmental studies by O.V.K.Reddy
6. Environmental Science and Engineering by Aloka Debi.

AI501PC : PYTHON PROGRAMMING
(Common to CSM & CSC)

B.Tech. III Year I Sem.

L T P C

3 0 0 3

Course Objectives:

- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

UNIT - I

Introduction to Python, Installing Python. How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops. Data types and Expressions: Strings, Assignment and Comments, Numeric Data Types and Character Sets, Expressions, Functions and Modules.

UNIT - II

Control Statements: Definite Iteration, Formatting Text for Output, Selection, Conditional Iteration. File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions. Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions-Generating Random Numbers, The math Module, Storing Functions in Modules.

UNIT - III

Strings and Text Files: Accessing Characters and Substrings in a String, Strings and Number System, String Methods, Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Text Files, Data Encryption, Lists, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples Sequences, Tuples. Dictionaries and Sets: Dictionaries, Sets, Serializing Objects. Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms

UNIT - IV

Design with Classes: Classes and Objects, Classes and Functions, Classes and Methods, Working with Instances, Inheritance and Polymorphism. Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, techniques for Designing Classes.

UNIT - V

Graphical User Interfaces: Behavior of terminal based programs and GUI-based programs, Coding simple GUI-based programs, other useful GUI resources. GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons. Simple Graphics and Image Processing: Over- view of Turtle Graphics, Two dimensional Shapes, Colors and RBG System, Image Processing.

TEXT BOOKS

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing

REFERENCE BOOKS

1. Introduction to Computation and Programming Using Python. John V. Guttag, The MIT Press.
2. James Payne, Beginning Python using Python 2.6 and Python 3, Wrox publishing
3. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3, The Pragmatic Bookshelf, 2nd edition (4 Oct. 2013)
4. Charles Dierach, Introduction to Computer Science using Python

CS502PC:AUTOMATA THEORY AND COMPILER DESIGN**B.Tech. III Year I Sem.****L T P C****3 1 0 4****Course Objectives**

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, intermediate code generation

Course Outcomes

- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool and design LR parsers

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 ϵ -transitions to NFA without ϵ -transitions. Conversion of NFA to DFA

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.

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Left-most and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT - III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The

language of a Turing machine

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines.

UNIT - IV

Introduction: The structure of a compiler,

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex,

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.

UNIT - V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax- Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

TEXT BOOKS:

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 Chandrashekar, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Kenneth C. Loudon, Thomson. Course Technology.

SM503MS:BUSINESS ECONOMICS AND FINANCIAL ANALYSIS**B.Tech.III Year I Sem.****L T P C****3 0 0 3****Course Objective:**

- To learn the basic Business types, impact of the Economy on Business and Firms specifically.
- To analyze the Business from the Financial Perspective.

Course Outcome:

- The students will understand the various Forms of Business and the impact of economic variables on the Business.
- The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.
- The Students can study the firm's financial position by analyzing the Financial Statements of a Company.

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, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III**Production, Cost, Market Structures & Pricing:**

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

TEXT BOOKS:

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.

CY504PC:PRINCIPLES OF COMPUTER NETWORKS**B.Tech.III Year I Sem.****L T P C****3 0 0 3****Prerequisites**

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives

- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes

- Gain the knowledge of the basic computer network technology.
- Gain the knowledge of the functions of each layer in the OSI and TCP/IP Reference model.
- Obtain the skills of subnetting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

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, The Network layer in 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.

TEXTBOOK:

1. Computer Networks--Andrew S Tanenbaum, David J. Wetherall, 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.

CY511PE: INTRODUCTION TO CLOUD SECURITY (Professional Elective – I)**B.Tech. III Year I Sem.****L T P C****3 0 0 3****Pre-requisites:**

- Computer Networks, Cryptography and Network Security, Cloud Computing.

Course Objectives:

- To understand the fundamentals concepts of cloud computing.
- To understand the cloud security and privacy issues.
- To understand the Threat Model and Cloud Attacks
- To understand the Data Security and Storage

Course Outcomes:

- Acquire the knowledge on fundamentals concepts of cloud computing.
- Distinguish the various cloud security and privacy issues.
- Analyze the various threats and Attack tools
- Understand the Data Security and Storage concepts.

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, Provider 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.

TEXT BOOKS:

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.

CY512PE: DATA ANALYTICS USING R(Professional Elective – I)**B.Tech. III Year I Sem****L T P C****3 0 0 3****Prerequisites**

1. A course on “Database Management Systems”.
2. Knowledge of probability and statistics.

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
- To understand the various search methods and visualization techniques.

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

- Understand the impact of data analytics for business decisions and strategy
- Carry out data analysis/statistical analysis
- To carry out standard data visualization and formal inference procedures
- Design Data Architecture
- Understand various Data Sources

UNIT - I

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

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications tovarious Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Millway Labs Jeffrey D Ullman Stanford Univ.

CY513PE: INTRODUCTION TO CYBER LAW (Professional Elective – I)**B.Tech. III Year I Sem.****L T P C****3 0 0 3****Course Objectives:**

- Gain an understanding of the evolution and jurisprudence of cyber law in India, including the IT Act 2000.
- Learn about digital signatures, e-governance, and their legal implications under the IT Act.
- Understand the legal framework for electronic contracts, their formation, and international perspectives.
- Explore taxation issues in cyberspace, cybercrimes, electronic evidence, and their adjudication under the IT Act.

Course Outcomes

- Learn evolution and key aspects of Indian cyber law, including recent amendments.
- Gain knowledge about the legalities of digital signatures and the role of e-governance in the IT Act.
- Develop an understanding of the legalities involved in electronic contracts and international conventions.
- Adapt in understanding and analyzing cybercrime, electronic evidence, and intellectual property rights in the context of IT.

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.

TEXT BOOKS:

1. Textbook on "Cyber Law", second edition, Pavan Duggal, Universal Law Publishing.
2. Textbook on "Indian Cyber law on Cybercrimes", Pavan Duggal,

REFERENCE BOOKS:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O'Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John Blackley," Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996.

CY514PE: CLOUD COMPUTING (Professional Elective-I)

B.Tech.III Year I Sem.

L T P C

3 0 0 3

Pre-requisites:

1. A course on "Computer Networks".
2. A course on "Operating System".

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models, Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing

Course Outcomes:

- Understand different computing paradigms and potential of the paradigms and specifically cloud computing
- Understand cloud service types, cloud deployment models and technologies supporting and driving the cloud
- Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers
- Understand the security concerns and issues in cloud computing
- Acquire the knowledge of advances in cloud computing.

UNIT-I

Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

UNIT- II

Cloud Deployment Models, Cloud Service Models, Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, Application Environment

UNIT- III

Virtualization, Programming Models for Cloud Computing: MapReduce, Cloud Haskell, Software Development in Cloud

UNIT-IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers

UNIT-V

SecurityinCloudComputing,andAdvancedConceptsinCloudComputing.

TEXTBOOK:

1. Chandrasekaran,K.Essentialsofcloudcomputing.CRCPress,2014

REFERENCEBOOKS:

1. CloudComputing:PrinciplesandParadigms,Editors:RajkumarBuyya,JamesBroberg, Andrzej M. Goscinski, Wiley, 2011
2. EnterpriseCloudComputing-Technology,Architecture,Applications,GautamShroff, Cambridge University Press, 2010
3. CloudComputingBible,BarrieSosinsky,Wiley-India,2010

AI505PC: PYTHON PROGRAMMING LAB**III Year B.Tech. CSC I Sem****L T P C****0 0 2 1**

Prerequisites: A course on “Programming for Problem Solving”.

Course Objectives

- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcome

- Student should be able to understand the basic concepts scripting and the contributions of scripting language
- Ability to explore python especially the object-oriented concepts, and the built in objects of Python.
- Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations

List of Experiments:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format “Sun May 29 02:26:23IST 2017”
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : $c/5 = f-32/9$]
10. Write a Python program to construct the following pattern, using a nested for loop

```
*
* *
* * *
* * * *
```

* * * * *

* * * *

* * *

* *

*

11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text-files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement $\text{pow}(x, n)$
20. Write a Python class to reverse a string word by word.

EN506HS:ADVANCED COMMUNICATION SKILLS LAB**III Year B.Tech. CSC I Sem****L T P C****0 0 2 1****INTRODUCTION:**

The introduction of the Advanced Communication Skills 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 interpersonal and professional communication in the globalized context.

The proposed course should be a laboratory course to enable students to use English effectively and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

COURSE OBJECTIVES:

- This Lab focuses on using multi-media instruction for language development to meet the following targets:
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

COURSE OUTCOMES:

- Students will be able to:
- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts.

SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

Activities on Fundamentals of Inter-personal Communication and Building Vocabulary -

Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one- word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

Activities on Writing Skills – Structure and presentation of different types of writing – letter Writing/ resume writing/ e-correspondence/technical report writing/ – planning for writing – improving students' writing skills.

Activities on Presentation Skills and Team Building – Oral presentations (individual and group) through JAM Sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/ assignments etc. Activities on Presentation Skills, Team Building and Leadership Skills through Problem solving and Team Development Exercises.

Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation

Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

MINIMUM REQUIREMENT:

- The Advanced Communication Skills (ACS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:
- Spacious room with appropriate acoustics. Round Tables with movable chairs
- Audio-visual aidsLCD Projector Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder Headphones of High quality
- The software consisting of the prescribed topics elaborated above should be procured and used. Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice. Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata McGraw- Hill 2009.

CY507PC:PRINCIPLES OF COMPUTER NETWORKS LAB**B.Tech. III Year I Sem.****L T P C****0 0 2 1****Course Objectives:**

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyze the traffic flow and the contents of protocol frames

Course Outcomes:

1. Implement data link layer framing 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

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
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.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. 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

TEXT BOOKS:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

MC510: INTELLECTUAL PROPERTY RIGHTS*B.Tech. III Year I Sem.****L T P C****2 0 0 0****Course Objectives:**

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular form of IPRs.
- Appraise new developments in IPR laws at national and international level

UNIT – I

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

UNIT – II

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

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

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

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd.

SD512PC:SKILL DEVELOPMENT COURSE –V(UIDESIGN-FLUTTER)

B.Tech. III Year I Sem.

L T P C

0 0 2 1

Course Objectives:

- To learn installation of SDK of Flutter, Xcode and Android Emulator
- Understanding Stateless and State full Widgets and Widget Tree
- Learning of Dart basics
- Application of Animation app.

Course Outcomes:

- Knowledge on installation of various softwares.
- Understanding of various Widgets
- Application of Animation Apps

UNIT-I

Introducing Flutter and Getting Started

- Introducing Flutter, Defining Widgets and Elements, Understanding Widget Lifecycle Events, The Stateless Widget Lifecycle, The Stateful Widget Lifecycle, Understanding the Widget Tree and the Element Tree
- ,Stateless WidgetandElementTrees,StatefulWidgetandElementTrees,Installingthe Flutter SDK, Installing on mac OS, System Requirements, Get the Flutter SDK, Check for Dependencies, iOS Setup: Install Xcode, Android Setup: Install Android Studio, Set Up the Android Emulator ,Installing on Windows ,System Requirements ,Getthe FlutterSDK, CheckforDependencies, Install AndroidStudio ,SetUptheAndroid Emulator, Installing on Linux, System Requirements, Getthe FlutterSDK,CheckforDependencies,InstallAndroidStudio,SetUptheAndroidEmulator,Configuring the Android Studio Editor.

UNIT-II

Creating a Hello World App Setting Up the Project,Using Hot Reload, Using Themesto Style Your App,Usinga Global App Theme, Using a Theme for Part of an App, Understanding Stateless and Stateful Widgets, Using External Packages, Searching for Packages, Using Packages

UNIT-III

Learning Dart Basics Use of Dart, Commenting Code, Running the main() Entry Point, Referencing Variables, Declaring Variables, Numbers, Strings, Booleans, Lists,Maps, Runes,Using Operators, Using Flow Statements, ifandelse, ternary operator, for Loops, while and do-while, while and break, continue, switch and case, Using Functions, Import Packages, Using Classes, Class Inheritance, Class Mixings, Implementing Asynchronous Programming.

UNIT-IV

Creating a Starter Project Template Creating and Organizing Folders and Files, Structuring Widgets.

Understanding the Widget Tree introduction to Widgets, Building the Full Widget Tree, Building a Shallow Widget Tree, Refactoring with a Constant, Refactoring with a Method, Refactoring with a Widget Class.

UNIT-V

Using Common Widgets: Using Basic Widgets, Safe Area, Container, Text, Rich Text, Column, Row, Column and Row Nesting, Buttons, Floating Action Button, Flat Button, Raised Button, Icon Button, Popup Menu Button, Button Bar, Using Images and Icons, Asset Bundle, Image, Icon, Using Decorators, Using the Form Widget to Validate Text Fields, Checking Orientation.

Adding Animation to an App

Using Animated Container, Using Animated Cross Fade, Using Animated Opacity, Using Animation Controller, Using Staggered Animations,

TEXTBOOK:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development, 1st edition, Wrox publisher.

REFERENCEBOOKS:

1. Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Packet Publishing Limited.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps, 1st edition, Apress.
3. Frank Zammetti, Practical Flutter: Improve your Mobile Development with Google's Latest Open-Source SDK, 1st edition, Apress.

CY601PC: INTRODUCTION TO CYBER SECURITY**B.Tech. III Year II Sem.****L T P C****3 0 0 3****Course Objectives:**

- Understand fundamental concepts of cyber security, including information assurance, cryptography, network security, and Windows security principles.
- Explore attacker techniques, motivations, and exploitation methods, gaining insights into cyber threats and vulnerabilities.

Course Outcomes:

- Understand basic cryptographic techniques for securing information and analyze cyber threat-susceptible concepts such as proxies, tunneling, and fraud techniques.
- Develop skills in identifying and exploiting vulnerabilities, including shell code, buffer overflows, SQL injection, and web exploit tools.
- Demonstrate knowledge of malicious code, its types (worms, viruses), and countermeasures against evasion, privilege escalation, and information theft.
- Analyze defense and analysis techniques, including memory forensics, honey pots, and intrusion detection systems, for proactive cyber security measures.

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- Shell code, 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, Honey pots, Malicious Code Naming, Automated Malicious Code Analysis Systems, Intrusion Detection Systems.

TEXT BOOK:

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

REFERENCE BOOK:

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

CS602PC: MACHINE LEARNING**B.Tech.III Year II Sem.****L T P C****3 0 0 3****Course Objectives:**

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based learning techniques

Course Outcomes:

- Distinguish between, supervised, unsupervised and semi-supervised learning
- Understand algorithms for building classifiers applied on datasets of non-linearly separable classes
- Understand the principles of evolutionary computing algorithms
- Design an assembler to increase the classification accuracy

UNIT-I

Learning–TypesofMachineLearning–SupervisedLearning–TheBrainandtheNeuron–Designa Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept LearningasSearch–FindingaMaximallySpecificHypothesis–VersionSpacesandtheCandidate EliminationAlgorithm–LinearDiscriminants:–Perceptron–LinearSeparability–LinearRegression.

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

LearningwithTrees–DecisionTrees–ConstructingDecisionTrees–ClassificationandRegression Trees– EnsembleLearning–Boosting–Bagging–DifferentwaystoCombineClassifiers–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–IndependentComponentAnalysis–LocallyLinearEmbedding–Isomap– LeastSquares 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

TEXTBOOKS:

1. Stephen Marsland, – Machine Learning –An Algorithmic Perspective, Second Edition, ChapmanandHall/CRCMachineLearningandPatternRecognitionSeries,2014.

REFERENCEBOOKS:

1. TomM Mitchell, – Machine Learning,FirstEdition,McGrawHillEducation, 2013.
2. PeterFlach, – MachineLearning:TheArtandScienceofAlgorithmsthatMakeSenseofData[], First Edition, Cambridge University Press, 2012.
3. JasonBell, – Machinelearning–HandsonforDevelopersandTechnicalProfessionals[],First Edition, Wiley, 2014
4. Ethem Alpaydin, – Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

CY603PC: CYBER CRIME INVESTIGATION & DIGITAL FORENSICS**B.Tech. III Year II Sem.****L T P C****3 0 0 3****Prerequisites**

1. Knowledge of computer hardware, operating systems, applications and networking is required.

Course Objectives:

- Know about role of digital devices in cyber crime investigation
- Learn about cyber crime investigation process and methodologies
- An introduction to the methodology and procedures associated with digital forensic analysis in a network environment.

Course Outcomes:

- To obtain and analyze digital information for possible use as evidence in civil, criminal or administrative cases.
- To learn about the importance of digital forensic principles and procedures
- To know legal considerations and digital evidence controls
- To learn about digital forensic tools

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 net-

works, Digital Evidence on physical and data link layers, Digital Evidence on Network and Transport layers.

TEXT BOOK:

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,
3. J. Sammons, Syngress Publishing, 2012. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010

CY621PE: DATABASE SECURITY (Professional Elective - II)**III Year B.Tech. CSC II-Sem****L T P C****3 0 0 3****Pre-Requisites:**

- Knowledge on Data base Management System

Course Objectives:

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

Course Outcomes:

1. Ability to carry out a risk analysis for large database.
2. Ability to set up, and maintain the accounts with privileges and roles.

UNIT - I

Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT - II

Security Models -2: Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion

Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT - III

Security Software Design: Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion

Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery

UNIT - IV

Models for the Protection of New Generation Database Systems -1: Introduction A Model for the

Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

UNIT - V

Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems: the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

TEXT BOOKS:

1. Database Security by Castano, Pearson Edition
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by Alfred basta, melissazgola, CENGAGE learning.

CY622PE: DATA PRIVACY (Professional Elective – II)**B.Tech. III Year II Sem.****L T P C****3 0 0 3****Course Objectives:**

- Instill an understanding of the essential importance of data privacy.
- Classify the necessary statistical and computational techniques essential for data sharing, particularly emphasizing applications in social and health sciences.
- Develop the foundational principles in architecture, algorithms, and technology for the preservation and maintenance of data privacy.

Course Outcomes:

- Outline essential rules and principles for safeguarding privacy and personally identifiable information.
- Develop data that facilitates meaningful statistical inference while minimizing the exposure of sensitive information.
- Identify potential threats related to different types of anonymized data.
- Classify and evaluate methods for generating test data with a focus on both privacy and utility-considerations.

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, l- 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 Anonymi-

zation 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.

TEXT BOOKS:

1. Nataraj Venkataramanan, Ashwin Sriram, Data Privacy: Principles and Practice, 2016, 1st Edition, Taylor & Francis. (ISBN No.: 978-1-49-872104-2), United Kingdom.

REFERENCE BOOKS:

1. B. Raghunathan, the Complete Book of Data Anonymization: From Planning to Implementation, 1st Edition, CRC press.
2. L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MIT Computer Science, 2002.
3. Nishant Bhajaria, Data Privacy: A runbook for engineers, Manning Publications.

CS623PE: SOFTWARE PROJECT MANAGEMENT(Professional Elective-II)**III Year B.Tech. CSC II-Sem****L T P C****3 0 0 3****Pre-Requisites:**

- Software Engineering

Course Objectives:

- Understanding the specific roles within a software organization as related to project and process management
- Understanding the basic infrastructure competences (e.g., process modeling and measurement)
- Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships.

Course Outcomes:

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- Compare and differentiate organization structures and project structures.
- Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools.

UNIT-I

Conventional Software Management: The waterfall Model, Conventional Software Management Performance, Evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II

Conventional and Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process.

Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases.

UNIT-III

- Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts.
- Model Based Software Architectures: A Management Perspective and Technical Perspective.

UNIT-IV

Flows of the Process: Software Process Workflows. Inter Trans Workflows.

Checkpoints of the Process: Major Milestone, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. Interaction Planning Process, Pragmatic Planning.

UNIT-V

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation: Building Blocks, the Project Environment. Project Control and Process Instrumentation: Server Care Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software

TEXT BOOKS:

1. Walker Rayce, "Software Project Management", 1998, PEA. Henrey, "Software Project Management", Pearson

REFERENCE BOOKS:

1. Richard H.Thayer." Software Engineering Project Management", 1997, IEEE ComputerSociety.
2. Shere K.D.: "Software Engineering and Management", 1998, PHI.
3. S.A. Kelkar, "Software Project Management: A Concise Study", PHI.
4. Hughes Cotterell, "Software Project Management", 2e, TMH. 88 5. Kaeron Conway"Software Project Management from Concept to D.

CY624PE: ETHICAL HACKING (Professional Elective – II)**B.Tech. III Year II Sem.****L T P C****3 0 0 3****Prerequisites:**

1. A course on “Operating Systems”
2. A course on “Computer Networks”
3. A course on “Network Security and Cryptography”

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models;
- Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes:

- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of atest
- Comprehend the dangers associated with penetration testing

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, Wardialing, 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

TEXT BOOK:

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.

CS604PC:MACHINE LEARNINGLAB**B.Tech. III Year II Sem****L T P C****0 0 2 1****Course Objective:**

- The objective of this lab is to get an over view of the various machine learning techniques and can demonstrate them using python.

Course Outcomes:

- Understand modern predictive data analysis
- Select data, model selection, model complexity and identify the trends
- Understand a range of machine learning algorithms along with their strengths and weaknesses
- Build predictive models from data and analyze their performance

List of Experiments

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for Mlapplication such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

TEXTBOOK:

1. Machine Learning – Tom M. Mitchell, -MGH.

REFERENCEBOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

CY605PC: CYBER CRIME INVESTIGATION & DIGITAL FORENSICS LAB**B.Tech. III Year II Sem.****L T P C****0 0 2 1****Course Objectives**

- To provide students with a comprehensive overview of collecting, investigating, preserving, and presenting evidence of cybercrime left in digital storage devices, emails, browsers, mobile devices using different Forensics tools
- To Understand file system basics and where hidden files may lie on the disk, as well as how to extract the data and preserve it for analysis.
- Understand some of the tools of e-discovery.
- To understand the network analysis, Registry analysis and analyze attacks using different forensics tools

Course Outcomes

- Learn the importance of a systematic procedure for investigation of data found on digital storage media that might provide evidence of wrong-doing
- To Learn the file system storage mechanisms and retrieve files in hidden format
- Learn the use of computer forensics tools used in data analysis.
- 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.

List of Experiments

1. Perform email analysis using the tools like Exchange EDB viewer, MBOX viewer and View user mailboxes and public folders, Filter the mailbox data based on various criteria, Search for particular items in user mailboxes and public folders
2. Perform Browser history analysis and get the downloaded content, history, 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 Last-view 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.

TEXT 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.

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 Zimmerman, X-ways forensics practitioners guide

MC609: CONSTITUTION OF INDIA*B.Tech. III Year II Sem****L T P C****2 0 0 0****Course Objectives:****Students will be able to:**

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

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

UNIT-I

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

UNIT-II

Philosophy of the Indian Constitution-Preamble Salient Features

UNIT-III

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 IV

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-V

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

UNIT VI

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:

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

MC611:ARTIFICIAL INTELLIGENCE**B.Tech. III Year II Sem****L T P C****2 0 0 0****Prerequisites:**

1. Programming for problem solving, Data Structures.

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

- Understand search strategies and intelligent agents
- Understand different adversarial search techniques
- Apply propositional logic, predicate logic for knowledge representation
- Apply AI techniques to solve problems of game playing, and machine learning.

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:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norving, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Richard K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert Systems – Patterson, Pearson Education

AI701PC / CS732PE: DEEP LEARNING
(Common to CSM & CSC)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modelling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Drop- out, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

CY702PC: VULNERABILITY ASSESSMENT AND PENETRATION TESTING**B.Tech. IV Year I Sem****L T P C****3 1 0 4****Prerequisites**

1. Knowledge in information security.
2. Knowledge on Web Application.

Course Objectives

- Give an introduction to Vulnerability Assessment and Penetration Testing.
- To be familiar with the Penetration Testing and Tools.
- To get an exposure to Metasploit exploitation tool, Linux exploit and Windows exploit.
- To gain knowledge on Web Application Security Vulnerabilities, Vulnerability analysis and Malware analysis.

Course Outcomes

- Learn to handle the vulnerabilities of a Web application
- Able to learn various penetration testing tools.
- Knowledge on Metasploit, Linux exploit and windows exploit tools
- Analyze various vulnerabilities

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.

TEXT BOOKS:

1. Gray Hat Hacking-The Ethical Hackers Handbook”, Allen Harper, Stephen Sims, MichaelBaucom, 3rd Edition, Tata Mc Graw-Hill.
2. The Web Application Hacker’s Handbook-Discovering and Exploiting Security flaws”, DafyddSuttard, Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. “Penetration Testing: Hands-on Introduction to Hacking”, Georgia Weidman, 1st Edition, NoStarch Press.
2. The Pen Tester Blueprint-Starting a Career as an Ethical Hacker “, L. Wylie, Kim Crawly, 1stEdition, Wiley Publications.

CY731PE: MOBILE APPLICATION SECURITY (Professional Elective – III)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Course Objectives:**

- This course provides a thorough understanding of mobile platforms, including attack surfaces, risk landscape & more.

Course Outcomes:

- Understand common mobile application security vulnerabilities
- Define the security controls of multiple mobile operating systems
- Understand and analyze Bluetooth technology
- understand and analyze overview of SMS security and Enterprise security

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 Redirects, 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 Proto-

col 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, 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.

TEXT BOOKS:

1. Mobile Application Security, Himanshu Dwivedi, Chris Clark, David Thiel, First edition, TataMcGraw 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.

AI732PE/CS701PC: BIG DATA ANALYTICS (Professional Elective – III)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Course Objectives:**

- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

UNIT - I

Data Management (NOS 2101): Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/signal/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Preprocessing. Export all the data onto Cloud ex. AWS/Rackspace etc.

Maintain Healthy, Safe & Secure Working Environment (NOS 9003): Introduction, workplace safety, Report Accidents & Emergencies, Protect health & safety as your work, course conclusion, assessment.

UNIT – II

Big Data Tools (NOS 2101): Introduction to Big Data tools like Hadoop, Spark, Impala etc., Data ETL process, Identify gaps in the data and follow-up for decision making.

Provide Data/Information in Standard Formats (NOS 9004):

Introduction, Knowledge Management, Standardized reporting & compliances, Decision Models, course conclusion. Assessment

UNIT - III

Big Data Analytics: Run descriptive to understand the nature of the available data, collate all the data sources to suffice business requirement, Run descriptive statistics for all the variables and observe the data ranges, Outlier detection and elimination.

UNIT - IV

Machine Learning Algorithms (NOS 9003): Hypothesis testing and determining the multiple analytical methodologies, Train Model on 2/3 sample data using various Statistical/Machine learning algorithms, Test model on 1/3 sample for prediction etc.

UNIT - V (NOS 9004)

Data Visualization (NOS 2101): Prepare the data for Visualization, Use tools like Tableau, Qlick View and D3, Draw insights out of Visualization tool. Product Implementation

TEXT BOOK:

1. Student's Handbook for Associate Analytics.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira (the authors have kindly made an online version available): <http://www.dataminingbook.info/uploads/book.pdf>
3. Mining of Massive Datasets Jure Leskovec Stanford Univ. Anand Rajaraman Millway Labs Jeffrey D. Ullman, Stanford Univ.
(http://www.vistrails.org/index.php/Course:_Big_Data_Analysis)

CY733PE: MALWARE ANALYSIS (Professional Elective - III)

IV Year B.Tech. CSC I-Sem

L T P C

3 0 0 3

Pre-requisites:

- Operating System Concepts and High Level & Low Level Programming (familiarity is fine, working knowledge not required at first).
- Fundamentals of networking.

Course Objective:

- The goal of malware analysis is to gain an understanding of how a specific piece of malware functions so that defenses can be built to protect an organization's network.

Course Outcome:

- To gain an understanding of how a specific piece of malware functions so that defenses can be built to protect an organization's network.
- Detection and mitigation of the potential threat.
- It helps incident responders and security analysts: Pragmatically triage incidents by level of severity. Uncover hidden indicators of compromise (IOCs) that should be blocked.

UNIT - I:

BASIC ANALYSIS: Basic Static Techniques, Malware Analysis in Virtual, Machines, Basic Dynamic Analysis

UNIT - II:

ADVANCED STATIC ANALYSIS: A Crash Course in x86 Disassembly, IDA Pro, Recognizing CCode Constructs in Assembly Analyzing Malicious Windows Programs

UNIT - III:

ADVANCED DYNAMIC ANALYSIS: Debugging, vi Brief Contents, Olly Dbg, Kernel Debugging with WinDbg

UNIT - IV:

MALWARE FUNCTIONALITY: Malware Behavior, Covert Malware Launching, Data Encoding, Malware-Focused Network Signatures

UNIT V :

ANTI-REVERSE-ENGINEERING: Anti-Disassembly, Anti-Debugging, Anti-Virtual Machine Techniques, Packers and Unpacking

TEXTBOOKS:

1. Michael Sikorski and Andrew Honig, "Practical Malware Analysis : The Hands-On Guide to Dissecting Malicious Software", No Starch Press, 2012.

REFERENCES:

1. Jamie Butler and Greg Hoglund, "Rootkits: Subverting the Windows Kernel", Addison- Wesley, 2005.
2. Dang, Gazet, Bachaalany, "Practical Reverse Engineering", Wiley, 2014.
3. Reverend Bill Blunden, "The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System" Second Edition, Jones & Bartlett, 2012.

CY734PE: EDGE ANALYTICS (Professional Elective – III)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Prerequisites**

- A basic knowledge of “Python Programming”.

Course Objectives

- The aim of the course is to introduce the fundamentals of Edge Analytics
- The course gives an overview of – Architectures, Components, Communication Protocols and tools used for Edge Analytics

Course Outcomes

- Understand the concepts of Edge Analytics, both in theory and in practical application
- Demonstrate a comprehensive understanding of different tools used at edge analytics
- Formulate, Design and Implement the solutions for real world edge analytics

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 Sigfox 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 edgdevice, 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

TEXT BOOK:

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

CY741PE: BLOCKCHAIN TECHNOLOGY (Professional Elective – IV)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Prerequisites:**

1. Knowledge in information security and applied cryptography.
2. Knowledge in Computer Networks

Course Objectives:

- To learn the fundamentals of Blockchain and various types of block chain and consensus mechanisms.
- To understand the public block chain system, Private block chain system and consortium block-chain.
- Able to know the security issues of blockchain technology.

Course Outcomes:

- Understanding concepts behind crypto currency
- Applications of smart contracts in decentralized application development
- Understand frameworks related to public, private and hybrid blockchain
- Create blockchain for different application case studies

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 Hyperledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXT BOOK:

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.

CY742PE: SOCIAL MEDIA SECURITY (Professional Elective – IV)**B.Tech. IV Year I Sem****L T P C****3 0 0 3****Course Objectives**

- Give introduction about the social networks, its use, the need of security in social data

Course Outcomes

- Learn about browser's risks
- Learn about Social Networking,
- Understand the risks while using social media.
- Understand security of different web browsers.
- Understand threats and safety measures involved using an email communication

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 Cyber crime, 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

TEXT BOOKS:

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: Alt-

shuler Y, Elovici Y, 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

CY743PE: WEB & DATABASE SECURITY (Professional Elective – IV)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Course Objectives**

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes:

- Understand the Web architecture and applications
- Understand client side and server-side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

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 Anti Theft, 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 and

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

TEXT BOOKS:

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

AI744PE: COMPUTER SECURITY AND AUDIT ASSURANCE (Professional Elective – IV)**B.Tech. IV Year I Sem.****L T P C****3 0 0 3****Course Objectives:**

- Develop Expertise in System Auditing and Control.
- Master Business Continuity and Disaster Recovery Planning.

Course Outcomes:

- Acquire knowledge of the COBIT framework and its application in auditing and assurance services.
- Develop expertise in Internal Control and Information System Audit.
- Learn standard practices, policies, audit planning, and risk assessment to be able to do thorough audits of computer systems.
- Learn to evaluate and manage risks effectively.
- Learn to conduct business impact analyses and develop appropriate disaster recovery strategies.

UNIT - I

System Audit and Assurance: Characteristics of Assurance services, Types of Assurance 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 Information System Audit: Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing, Conducting audits for Banks.

UNIT - IV

Audit Control: 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: Data backup/storage, Developing appropriate Disaster recovery strategy, Business Impact analysis.

TEXT BOOK:

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw- Hill Education, 01-Jan2005

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.

CY703PC: VULNERABILITY ASSESSMENT & PENETRATION TESTING LAB**B.Tech. IV Year I Sem.****L T P C****0 0 2 1****Course Objectives:**

- Learning Penetration Testing methodologies
- Monitoring the network traffic
- To understand the host and services discovery

Course Outcomes:

- Design for monitoring network traffic.
- Perform different penetration testing methods.
- Design different types of vulnerabilities scanning.
- Understand web application assessment.

List of Experiments:

1. Implement Monitoring of Network Traffic using
 - a. wireshark
 - b. tcpdump
 - c. Nagios
 - d. solarwinds
2. Implement Host & Services Discovery using Nmap, massscan.
3. Implement Vulnerability Scanning using OpenVAS, Zaproxy, SQLmap.
4. Implement Internal Penetration Testing.
 - a. Mapping
 - b. Scanning
 - c. Gaining access through CVE's
 - d. Sniffing POP3/FTP/Telnet Passwords
 - e. ARP Poisoning
 - f. DNS Poisoning
5. Implement External Penetration Testing.
 - a. Evaluating external Infrastructure.
 - b. Creating topological map & identifying IP address of target.
 - c. Lookup domain registry for IP information.
 - 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,

TEXT BOOKS:

1. " Gray Hat Hacking-The Ethical Hackers Handbook", Allen Harper, Stephen Sims, MichaelBaum, 3rd Edition, Tata Mc Graw-Hill.
2. " The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", DafyddSuttard, Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, NoStarch Press.
2. " The Pen Tester Blueprint-Starting a Career as an Ethical Hacker ", L. Wylie, Kim Crawly, 1stEdition, Wiley Publications.

AI704PC:DEEP LEARNING LAB
(Common to CSM & CSC)

B.Tech.IV Year I Sem.

L T P C
0 0 2 1

Pre requisite:

- Any programming language Python/R/Matlab

Course Objectives:

- To implement ANN and Deep Learning concepts

List of Experiments:

1. Implementation of MP model
2. Implementation of feed forward neural network
3. Implementation of back propagation neural network
4. Implement all activation function of neural network for any pattern recognition application
5. Implement any one of ImageNet or GoogleNet
6. Implement a system to recognize hand written character using CNN
7. Classify images appropriately using CNN
8. Implement LSTM Neural Network for TimeSeries Prediction

CY851PE: QUANTUM COMPUTING (Professional Elective – V)**B.Tech. IV Year II Sem.****L T P C**
3 0 0 3**Course Objectives:**

1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics

Course Outcomes:

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT – I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrices, Transcendental Numbers.

UNIT - II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT - III

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT - IV

Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

UNIT - V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications.

TEXT BOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
3. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

CY852PE: DATA ANALYTICS FOR FRAUD DETECTION (Professional Elective – V)**B.Tech. IV Year II Sem.****L T P C****3 0 0 3****Course Objectives**

- Discuss the overall process of how data analytics is applied
- Discuss how data analytics can be used to better address and identify risks
- Help mitigate risks from fraud and waste for our clients and organizations

Course Outcomes

- Formulate reasons for using data analysis to detect fraud.
- Explain characteristics and components of the data and assess its completeness.
- Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.
- Automate the detection process.
- Verify results and understand how to prosecute fraud

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

TEXT BOOK:

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 toUncovering Fraud in Core Business Systems, Wiley

CY853PE: 5G TECHNOLOGIES (Professional Elective – V)**B.Tech. IV Year II Sem.****L T P C****3 0 0 3****Course Objectives:**

- Knowledge on the concepts of 5G and 5G technology and drivers, understand 5G network architecture, components, features and their benefits.

Course Outcomes:

- Understand 5G and 5G Broadband Wireless Communications
- Understand 5G wireless Propagation Channels
- Understand the significance of radio access technologies for 5G
- Analyze Device-to-device (D2D) communications
- Learn Massive MIMO propagation channel models

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 mmWave, 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.

TEXT BOOKS:

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 inWireless Communication Systems from Mobile to 5G”, CRC Press.
4. Theodore S. Rappaport, Robert W. Heath, Robert C. Danials, James N. Murdock “Millimeter-Wave Wireless Communications”, Prentice Hall Communications.
5. Martin Sauter “From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile-Networks and Mobile Broadband”, Wiley-Blackwell.

DS854PE: DEVOPS (Professional Elective – V)**B.Tech. IV Year II Sem.****L T P C****3 0 0 3****Pre-Requisites:**

1. Software Engineering
2. Software Project Management

Course Objectives:

- Understand the skill sets and high-functioning teams involved in Agile , DevOps and related-methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

Course Outcomes:

- Understand the various components of Devops environment.
- Identify Software development models and architectures of DevOps
- Use different project management and integration tools.
- Select an appropriate testing tool and deployment model for project.

UNIT- I**Introduction to DevOps:**

Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

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, Micro services 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 buildservers, Collating quality measures.

UNIT- V

Testing Tools and Deployment:

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, SaltStack and Docker.

TEXT BOOKS:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wileypublications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley.

CY861PE: IOT CLOUD PROCESSING AND ANALYTICS (Professional Elective – VI)**B.Tech. IV Year II Sem.****L T P C****3 0 0 3****Course Objectives**

- To analyze the data generated from IoT device, store in cloud, to be able to manage IoT data-stored in cloud

Course Outcomes

- Learn IoT Big data challenges
- Integrate Cloud and Big Data for IOT analytics
- Analyze sensor data streams for events
- Know open source framework for IoT analytics
- Review tools for semantic and data stream analytics

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 Analytics
- 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

TEXT BOOKS:

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,Wiley Publishing.

CY862PE: SECURITY INCIDENT AND RESPONSE MANAGEMENT
(Professional Elective – VI)

B.Tech. IV Year II Sem.

L T P C

3 0 0 3

Prerequisites:

- Knowledge of information security and applied cryptography.
- Knowledge of Operating Systems.

Course Objectives:

- Give an introduction to the preparation of inevitable incidents, incident detection and characterization.
- To get exposure to live data collection and forensic duplication.
- To gain knowledge on data collection in Windows, Unix and Mac OS Systems.

Course Outcomes:

- Learn how to handle the incident response management.
- Perform live data collection and forensic duplication.
- Identify network evidence.
- Analyze data to carry out an investigation.
- Knowledge on investigation on Mac and Windows OS systems

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 DataCollection 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 application data stored? General Investigation methods, Web Browser, Email Clients, Instant Message Clients.

TEXT BOOK:

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, Apress.
2. "The Computer Incident Response Planning Handbook: Executable Plans for Protecting Information at Risk", N.K. McCarthy, Tata McGraw-Hill.

AI863PE: SEMANTIC WEB AND SOCIAL NETWORKS (Professional Elective - VI)**B.Tech IV Year II-Sem****L T P C****3 0 0 3****Pre-Requisites:**

- Knowledge on Internet
- XML

Course Objectives:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

Course Outcome:

- Understand Electronic sources for network analysis and different Ontology languages. Model and aggregating social network data.
- Develop social-semantic applications.
- Evaluate Web- based social network and Ontology.

UNIT -I:

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT -II:

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III:

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV:

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services,

Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT-V:

Social Network Analysis and semantic web:What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R.Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor& Francis Group)
3. Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.

CY864PE: QUANTUM CRYPTOGRAPHY (Professional Elective – VI)**B.Tech. IV Year II Sem.****L T P C****3 0 0 3****Prerequisites:**

- Quantum computing

Course Objectives

- Objective of the course is to build quantum-preparedness for the post quantum era.

Course Outcomes

- Basic understanding about quantum information and computation.
- Understand attack Strategies on QKD Protocols
- Analyze and understand statistical analysis of QKD Networks in Real-Life Environment
- Apply Quantum-cryptographic networks

UNIT - I

Quantum Information Theory, Unconditional Secure Authentication, Entropy, Quantum Key Distribution, Quantum Channel, Public Channel, QKD Gain, Finite Resources

UNIT - II

Adaptive Cascade Introduction, Error Correction and the Cascade Protocol, Adaptive Initial Block-Size Selection, Fixed Initial Block-Size, Dynamic Initial Block-Size, Examples

UNIT - III

Attack Strategies on QKD Protocols: Introduction, Attack Strategies in an Ideal Environment, Individual Attacks in an Realistic Environment QKD Systems: Introduction, QKD Systems

UNIT - IV

Statistical Analysis of QKD Networks in Real-Life Environment: Statistical Methods, Statistical Analysis QKD Networks Based on Q3P: QKD Networks, PPP, Q3P, Routing, Transport

UNIT - V

Quantum-Cryptographic Networks from a Prototype to the Citizen: The SECOQC Project, How to Bring QKD into the “Real” Life The Ring of Trust Model: Introduction, Model of the Point of Trust, Communication in the Point of Trust Model, Exemplified Communications, A Medical Information System Based on the Ring of Trust

TEXT BOOK:

1. Kollmitzer C., Pivk M. (Eds.), Applied Quantum Cryptography, Lect. Notes Phys. 797 (Springer, Berlin Heidelberg 2010).

REFERENCE BOOKS:

1. Gerald B. Gilbert, Michael Hamrick, and Yaakov S. Weinstein, Quantum Cryptography, WorldScientific Publishing.
2. Gilles Van Assche, Quantum Cryptography and Secret-Key Distillation, Cambridge University-Press.

CY611OE:INTRODUCTION TO CYBER SECURITY (OPEN ELECTIVE – I)**L T P C**
3 0 0 3**Prerequisites: NIL Course objectives:**

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes:

The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT- I

Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT - II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

CY612OE: INTRODUCTION TO CYBER LAW (Open Elective - I)**L T P C****3 0 0 3****Objectives**

- To understand the computer security issues
- To make secure system planning, policies

Outcomes

- Students who successfully complete this class will be able to:
- Describe laws governing cyberspace and analyze the role of Internet Governance in framing policies for Internet security
- the importance of ethics in legal profession and determine the appropriate ethical and legal behavior according to legal frameworks

UNIT - I

Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT - II

Secure System Planning and administration, Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT - III

Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - Process management-planning and preparation-developing policies-asset classification policy- developing standards.

UNIT - IV

Information security: fundamentals-Employee responsibilities- information classification- Information handling- Tools of information security- Information processing-secure program administration.

UNIT - V

Organizational and Human Security: Adoption of Information Security Management Standards, Human

Factors in Security- Role of information security professionals.

REFERENCES

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2ndEdition, O' Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd
5. Edition, Prentice Hall, 1996
6. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997
7. James Graham, " Cyber Security Essentials" Averbach Publication T & F Group.

CY6130E: FUNDAMENTALS OF ETHICAL HACKING (Open Elective - I)

L T P C

3 0 0 3

Prerequisites:

- A course on “Operating Systems”
- A course on “Computer Networks”
- A course on “Network Security and Cryptography”

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes:

- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
- Comprehend the dangers associated with penetration testing

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, Wardialing, 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.

TEXT BOOK:

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

CY7210E: CRYPTOGRAPHY AND NETWORK SECURITY (Open Elective-II)**L T P C****3 0 0 3****Course Objectives:**

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e- mail message.
- Discuss Web security and Firewalls

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

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.

TEXT BOOKS:

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

CY722OE: FUNDAMENTALS OF DATABASE SECURITY (Open Elective - II)**L T P C**
3 0 0 3**Course Objectives:**

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

Course Outcomes:

- Ability to carry out a risk analysis for large database.
- Ability to set up, and maintain the accounts with privileges and roles.

UNIT - I

- Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions
- Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT - II

- Security Models -2: Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion
- Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT - III

Security Software Design: Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison.

Introduction IDES System RETISS System ASES System Discovery

UNIT - IV

Models for the Protection of New Generation Database Systems -1: Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

UNIT - V

Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New

Generation Database Systems: the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

TEXT BOOKS:

1. Database Security by Castano, Pearson Edition
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by Alfred basta, melissazgola, CENGAGE learning.

CY723OE: INTRODUCTION TO CLOUD COMPUTING (Open Elective - II)**L T P C****3 0 0 3****Pre-requisites:**

- A course on “Computer Networks”
- A course on “Operating Systems”
- A course on “Distributed Systems”

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

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, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej
2. M. Goscinski, Wiley, 2011.
3. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
4. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

CY8310E: INTRODUCTION TO CLOUD SECURITY (Open Elective - III)**L T P C**
3 0 0 3**Course Objectives:**

- Understand the fundamentals of cloud computing.
- Understand the requirements for an application to be deployed in a cloud. 3. Become knowledgeable in the methods to secure cloud.

UNIT – I

Cloud Computing Fundamentals: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture.

UNIT – II

Cloud Applications: Technologies and the processes required when deploying web services- Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages- Development environments for service development; Amazon, Azure, Google App.

UNIT – III

Securing The Cloud: Security Concepts - Confidentiality, privacy, integrity, authentication, nonrepudiation, availability, access control, defence in depth, least privilege- how these concepts apply in the cloud and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud

UNIT - IV

Virtualization Security: Multi-tenancy Issues: Isolation of users/VMs from each other- How the cloud provider can provide this- Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security- storage considerations, backup and recovery- Virtualization System Vulnerabilities.

UNIT - V

Cloud Security Management: Security management in the cloud – security management standards- SaaS, PaaS, IaaS availability management- access control- Data security and storage in cloud.

TEXT BOOK:

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition [ISBN: 978- 0521137355], 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", Tata McGraw-Hill Osborne Media; 1 edition 22, [ISBN: 0071626948], 2009.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly Media; 1 edition, [ISBN: 0596802765], 2009.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security", Wiley [ISBN: 0470589876], , 2010.

REFERENCE BOOK:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

CY832OE: FUNDAMENTALS OF CYBER FORENSICS (Open Elective - III)**L T P C****3 0 0 3**

Prerequisites: Network Security

Course Objectives:

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

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.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

CY8330E: NETWORK PROGRAMMING (Open Elective - III)**L T P C****3 0 0 3****Prerequisites:**

1. Knowledge on Computer Networks

Course Objectives:

- To understand inter process and inter-system communication
- To understand socket programming in its entirety
- To understand usage of TCP/UDP / Raw sockets
- To understand how to build network applications

Course Outcomes:

- To write socket API based programs
- To design and implement client-server applications using TCP and UDP sockets
- To analyze network programs

UNIT - I

- Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.
- Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT - II

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host. Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

I/O Multiplexing: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server,

UNIT - III

- Socket options: getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.
- Advanced I/O Functions-Introduction, Socket Timeouts, recv and send Functions, readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued?, Sockets and Standard I/O, T/TCP: TCP for Transactions.

UNIT - IV

- Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.
- Daemon Processes and inetd Superserver – Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function
- Broadcasting- Introduction, Broadcast Addresses, Unicast versus Broadcast, dg_cli Function Using Broadcasting, Race Conditions
- Multicasting- Introduction, Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, mcast_join and Related Functions, dg_cli Function Using Multicasting, Receiving Mbone Session Announcements, Sending and Receiving, SNTP: Simple Network Time Protocol, SNTP (Continued)

UNIT - V

- Raw Sockets-Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Traceroute Program, An ICMP Message Daemon,
- Datalink Access- Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux: SOCK_PACKET, libpcap: Packet Capture Library, Examining the UDP Checksum Field.
- Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXT BOOKS:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1st Edition, - W. Richard Stevens. PHI.

REFERENCE BOOKS:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education