CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

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

R22

INFORMATION TECHNOLOGY SYLLABUS

Established: 2010 **EAMCET Code: CMRN**

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 NehruTechnological 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 coursesin 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 processof 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 anundergraduate 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 thecourses required for the B.Tech. Degree.
- **Pre-requisite:** A specific course or subject, the knowledge of which is required to completebefore 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 dateof 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 functionindependently 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 toframe the regulations, course structure, and syllabi under autonomous status.

The autonomous regulations, course structure, and syllabi have been prepared after prolongedand 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 instituteand brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS (R22) FOR B.TECH REGULAR STUDENTSWITH 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 BasedCredit 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 otherorder 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 eightacademic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate programme and award of the B.Tech. Degree.

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

3.2.1 Semester Scheme

Each undergraduate programme is of 4 academic years (8 semesters) with the academicyear divided into two semesters of 22 weeks ($\geq$ 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: tutorialperiods: 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 anycredits.

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	ElectiveCours-es(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) limitedto 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 coursegroup/ category as listed in the course structure, only the first mentioned subject/ coursein 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 Headof 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 Headof the Department, with due notification and time-framed schedule, within **a week** afterthe 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 ofthe current semester.

4.9 **Open Electives**: The students have to choose three Open Electives (OE-I, II & III) fromthe list of Open Electives given by other departments. However, the student can opt foran Open Elective subject offered by his own (parent) department, if the student has notregistered 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 asand 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 isdeemed 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 isscheduled.

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 toSecond year first semester	Regular course of study of first yearsecond semester. Must have secured at least 20 credits outof 40 credits i.e., 50% credits up to first yearsecond semester from all the relevantregular and supplementary examinations, whether the student takes thoseexaminations or not.
3.	Second year first semester toSecond year second semester	Regular course of study of second year first semester.
4	Second year second semesterto Third year first semester	Regular course of study of second year second semester. Must have secured at least 48 credits outof 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes thoseexaminations 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 semesterto Fourth year first semester	Regular course of study of third year second semester. Must have secured at least 72 credits outof 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes thoseexaminations 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), andCGPA ≥ 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 '**extrasubjects**' (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 beindicated in the grade card / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items6 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 reappearfor 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 carriedover, and added to the marks to be obtained in the SEE supplementary examination forevaluating 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.

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

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

2. Assignment for 5 marks. (**Average of 2 Assignments** each for 5 marks)

3. Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in theconcerned 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 shallbe 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 ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.*
- *In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.*

There is NO Computer Based Test (CBT) 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 60marks 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 unitscarrying 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 ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.
- In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

8.4 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 SeniorFaculty 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 committeefor 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 duringIV Year II Semester. Student has to submit project work report at the end of IV Year IISemester. The project shall be evaluated for 100 marks before commencement of SEETheory 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 reporton 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 fromthe 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 totalof 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) areless 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 marksfor 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 remainthe same as those obtained earlier.

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

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

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

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

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

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

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 gradeawarded for that i^{th} subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses (of 160) in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

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

(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 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

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**

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 becomethe 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 declaredsuccessful 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 placedin 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 beplaced 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, thestudent 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 R22Regulations 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/topicsin 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”.

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ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)
FROMTHE 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 lessthan 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 sixacademic 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 yearfirst semester.
2	Second year second semester tothird year first semester	Regular course of study of secondyear second semester. Must have secured at least 24 creditsout of 40 credits i.e., 60% credits up to second year second semester from all therelevant regular and supplementary examinations, whether the student takesthose examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third yearfirst semester.
4	Third year second semester tofourth year first semester	Regular course of study of third yearsecond semester. Must have secured at least 48 creditsout of 80 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takesthose examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth yearfirst 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.

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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 formof material concerned with or related to the subject of the examination (theory orpractical) 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 anyother 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 otherform 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 isalso debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all thesubjects 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 againsthim.
4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during theexamination 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 dutyin or outside the examination hall or anyof 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 inany 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 policeand 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 firearmin 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 andforfeits 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 6to 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 andforfeits 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 ofthat semester/year.
11.	Copying detected on the basis of internalevidence, 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 11shall 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 inencouraging 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 specificperiod of not less than one year.

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B. Tech in INFORMATION TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

COURSE STRUCTURE (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	CH102BS	Engineering Chemistry	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EN104HS	English for Skill Enhancement	2	0	0	2
5	ME105ES	Computer Aided Engineering Graphics Lab	0	0	3	1.5
6	CH106BS	Engineering Chemistry Lab	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EN108HS	English Language and Communication Skills Lab	0	0	3	1.5
9	SD109BS	Skill Development Course-I (Aptitude and Logic Building)	0	0	2	1
		Induction Programme				
Total Credits			**11**	**2**	**13**	**19.5**

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	AP202BS	Applied Physics	3	1	0	4
3	CS203ES	Data Structures	3	1	0	4
4	EE204ES	Basic Electrical Engineering	3	0	0	3
5	IT205ES	IT Workshop	0	0	3	1.5
6	AP206BS	Applied Physics Lab	0	0	2	1
7	CS207ES	Data Structures Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
9	SD209EN	Skill Development Course- II (Interchange-Business English)	0	0	2	1
Total Credits			**12**	**3**	**11**	**20.5**

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Matrix Algebra & Differential Equations	3	1	0	4
2	AP102BS	Applied Physics (Revised)	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EE104ES	Basic Electrical Engineering (Revised)	3	0	0	3
5	IT205ES	IT Workshop Lab (Revised)	0	0	3	1.5
6	AP106BS	Applied Physics Lab (Revised)	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EE108ES	Basic Electrical Engineering Lab (Revised)	0	0	2	1
9	SD209EN	Skill Development Course - I (Interchange - Business English) (Revised)	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 (Revised)	3	1	0	4
3	CS203ES	Data Structures	3	1	0	4
4	EN204HS	English for Skill Enhancement (Revised)	2	0	0	2
5	ME105ES	Computer Aided Engineering Graphics Lab (Revised)	0	0	3	1.5
6	CH206BS	Engineering Chemistry Lab (Revised)	0	0	2	1
7	CS207ES	Data Structures Lab	0	0	2	1
8	EN108HS	English Language and Communication Skills Lab (Revised)	0	0	3	1.5
9	SD109BS	Skill Development Course - II (Aptitude and Logic Building) (Revised)	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	EC301ES	Analog & Digital Electronics	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	EC306ES	Analog & Digital Electronics 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	*MC310	Environmental Science	2	0	0	0
Total Credits			**17**	**1**	**8**	**20**

II YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	SM401MS	Business Economics & Financial Analysis	3	0	0	3
2	IT402PC	Discrete Mathematics	3	0	0	3
3	IT403PC	Database Management Systems	3	0	0	3
4	CS404PC	Python Programming	3	0	0	3
5	CS405PC	Software Engineering	3	0	0	3
6	IT406PC	Database Management Systems Lab	0	0	2	1
7	CS407PC	Python Programming Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real Time Research Project/ Societal Related Project	0	0	2	1
10	SD410PC	Skill Development Course-IV(NodeJS\ React JS\ Django)	0	0	2	1
11	*MC411	Gender Sensitization Lab	0	0	2	0
Total Credits			**15**	**0**	**12**	**20**

***MC– Satisfied/Unsatisfied**

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	IT501PC	Data Communications and Computer Networks	3	0	0	3
2	IT502PC	Design and Analysis of Algorithms	3	1	0	4
3	CS503PC	Artificial Intelligence	3	0	0	3
4	IT504PC	Devops	3	0	0	3
5		Professional Elective-I	3	0	0	3
6	CS505PC	Computer Networks Lab	0	0	2	1
7	CS506PC	Artificial Intelligence Lab	0	0	2	1
8	EN506HS	Advanced Communication Skills Lab	0	0	2	1
9	SD512PC	Skill Development Course-V (UI Design- Flutter)	0	0	2	1
10	*MC509	Constitution of India	2	0	0	0
Total Credits			**17**	**1**	**8**	**20**

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	IT601PC	Automata Theory and Compiler Design	3	1	0	4
2	CS602PC	Machine Learning	3	0	0	3
3	IT603PC	Internet Of Things	3	0	0	3
4		Professional Elective– II	3	0	0	3
5		Open Elective-I	3	0	0	3
6	CS604PC	Machine Learning Lab	0	0	2	1
7	IT605PC	Internet Of Things Lab	0	0	2	1
8	CS607PROJ	Industrial Oriented Mini Project/ Internship	0	0	0	2
9	*MC608	Intellectual Property Rights	2	0	0	0
Total Credits			**17**	**1**	**4**	**20**

***MC– Satisfied/Unsatisfied**

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	IT701PC	Data Analytics	3	0	0	3
2	IT702PC	Information Security	3	0	0	3
3		Professional Elective-III	3	0	0	3
4		Professional Elective-IV	3	0	0	3
5		Open Elective-II/ MOOCS	3	0	0	3
6	IT703PC	Data Analytics using R Lab	0	0	3	1.5
7	IT704PC	Information Security Lab	0	0	3	1.5
8	IT705PROJ	Project-I	0	0	6	3
9						
Total Credits			**15**	**0**	**12**	**21**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective-V	3	0	0	3
2		Professional Elective-VI	3	0	0	3
3		Open Elective-III/MOOCS	3	0	0	3
4	IT801PROJ	Seminar	0	0	2	1
5	IT802PROJ	Project-II	0	0	18	9
Total Credits			**9**	**0**	**20**	**19**

Professional Elective–I

IT511PE	Biometrics
CS504PC/ IT512PE	Data Mining
IT513PE	Principle of Programming Languages
CS514PE	Computer Graphics

Professional Elective–II

CS621PE	Network Programming & Management
CS622PE	Natural Language Processing
IT623PE	Full stack Development
IT624PE	Real Time Systems

Professional Elective–III

IT731PE	Social Media Security
CS732PE /IT732PE/ AI701PC	Deep Learning
IT733PE/ DS744PE	Software Project Management
IT734PE/ AI733PE	Image Processing

Professional Elective–IV

IT741PE	Cyber Security
CS742PE	Semantic Web & Social Networks
IT743PE	Software Metrics and Measures
IT744PE	Information Retrieval System

Professional Elective–V

IT851PE/ CS851PE	Block chain Technology
CS852PE	Mobile Application Development
CS853PE	Design Patterns
IT854PE	Speech Recognition

Professional Elective– VI

IT861PE	Ethical Hacking
CS863PE/ IT862PE	Cloud Computing
IT863PE	Software Testing Methodologies
CS864PE/ AI853PE	Computer Vision

Open Elective-I

IT611OE	Introduction to Python Programming
IT612OE	Database Management Systems
IT613OE	Cyber Security

Open Elective-II/MOOCs

IT721OE	Introduction to Web Programming
IT722OE	Operating Systems
IT723OE	Artificial Intelligence

Open Elective-III/ MOOCs

IT831OE	Java Programming
IT832OE	Web Services
IT833OE	Ethical Hacking

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	CS203ES	Data Structures	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	CS207ES	Data Structures 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**	**12**	**20**

I Year B.Tech. I Sem. **L T P C**
3 1 0 4

(MA101BS) MATRIX ALGEBRA AND DIFFERENTIAL EQUATIONS

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 eigenvectorsand 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 findthe 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 $e^{ax}, sinax, cosaxe^{ax}, sinax, cosax$, 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, 11thReprint, 2010.

REFERENCE 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, 9thEdition, Pearson, Reprint, 2002.

I Year B.Tech. I Sem. **L T P C**

3 1 0 4

AP102BS: APPLIED PHYSICS

(Common for CSE, ECE, IT)

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

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

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

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

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

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 thEdiion,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. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
5. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Stor-

age Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group.

6. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

B.Tech. I Year I Sem. **L T P C**

3 0 0 3

(CS103ES): PROGRAMMING FOR PROBLEM SOLVING

Common to CSE, CSM, CSD, CSC, IT, ECE and ME

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 withexamples, 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) Enumeration data 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 toexisting files, Writing and reading structures using binary files, Random access using fseek, ftell andrewind 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 ofdifferent data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sortarray of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexitythrough 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

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

EE104ES/EE204ES: BASIC ELECTRICAL ENGINEERING

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.

B.TECH I Year I Sem. **L T P C**

0 0 3 1.5

IT105ES/IT205ES - IT Workshop

Course Objectives: The IT Workshop for engineers is a training lab course spread over 60 hours. Themodules include training on PC Hardware, Internet & World Wide Web and Productivity tools includingWord, 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 instructorshould verify the installation and follow it up with a Viva.

Internet & World Wide Web

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

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxysettings, 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 browsersto 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) officeor equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word asword Processors, Details of the four tasks and features that would be covered in each,

Using LaTeXand 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, Paragraphsand 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, Conditionalformatting.

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.

B.TECH I Year I/I Sem.

L	T	P	C
0	0	3	1.5

AP106BS: APPLIED PHYSICS LAB

(Common for CSE, ECE, IT, CSM, CSD & CSC)

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.

B.Tech. I Year I Sem.

L	T	P	C
0	0	3	1.5

CS107ES PROGRAMMING FOR PROBLEM SOLVING LAB

[Note:The programs may be executed using any available Open Source/ Freely available IDESome of the Tools available are:
CodeLite: https://codelite.org/ Code:Blocks: http://www.codeblocks.org/
DevCpp : http://www.bloodshed.net/devcpp.htmlEclipse: 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:

1. 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.
2. 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:

1. Write a program for finding the max and min from the three numbers.
2. Write the program for the simple, compound interest.
3. 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.

4. 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:

   5 x 1 = 5

   5 x 2 = 10

   5 x 3 = 15

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

Expression Evaluation:

1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at ^ 2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec ^ 2 (= 9.8 m/s ^ 2)).
2. 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)
3. Write a program that finds if a given number is a prime number
4. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
5. 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. Writea C program to generate the first n terms of the sequence.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a C program to find the roots of a Quadratic equation.
8. Write a C program to calculate the following, where x is a fractional value.i. 1-x/2 +x ^ 2/4-x ^ 3/6
9. 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+ +x ^ n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
3. Write a C program that uses functions to perform the following:
4. Addition of Two Matrices
5. Multiplication of Two Matrices
6. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
7. Write C programs that use both recursive and non-recursive functions
8. To find the factorial of a given integer.

9. To find the GCD (greatest common divisor) of two given integers.
10. To find x ^ n
11. Write a program for reading elements using a pointer into an array and display the values usingthe array.

B.Tech. I Year I Sem. **L T P C**

0 0 2 1

EE108ES: BASIC ELECTRICAL ENGINEERING LAB

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

B.Tech I Year I Sem. **L T P C**

0 0 2 1

INTERCHANGE - BUSINESS ENGLISH

(Common for CSE, ECE, IT, CSM, CSD & CSC)

COURSE CODE: SD109EN/SD209EN

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, thesignificance of English increased rapidly. But lack of exposure towards English Communication is a serious handicap forany 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 inB.Techfirst year to prepare the students to get the advantage when enter the job world. In today'sglobalization, 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 -- Gerundsand 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 work-places --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 yours 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

I Year B.Tech. II Sem. **L T P C**

3 1 0 4

(MA201BS) VECTOR CALCULUS AND TRANSFORMS

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:

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

I Year B.Tech. II Sem. **L T P C**

3 0 0 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- Dulongs 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 ,Electro chemical 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

B.Tech. I Year II Sem. **L T P C**

3 0 0 3

CS203ES DATA STRUCTURES

Prerequisites: Programming for Problem Solving

Course Objectives

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes

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

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOK:

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

B.Tech. I Year I/ II Sem. **L T P C**
2 0 0 2

ENGLISH FOR SKILL ENHANCEMENT

(Common for CSE, ECE, IT, CSM, CSD & CSC)

COURSE CODE: EN104HS/EN204HS

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 Cul-***

ture"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 andCulture"*** 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.

I Year B.Tech. II Sem. **L T P C**

0 0 3 1.5

(ME104ES): COMPUTER AIDED ENGINEERING GRAPHICS LAB

Pre-requisites: Basic Computer Knowledge

Course Objectives:

- To provide basic concepts in engineering graphics.
- To impart knowledge about standard principles of orthographic projections of objects.
- To draw sectional views and pictorial views of solids.

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

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.
- Estimate different projection of points, lines, planes, solids and sectional views.
- Able to sketch 2D orthographic drawings and 3D Isometric views.
- Create and modify 2D orthographic drawings using Auto CAD software.

Unit-I

- **INTRODUCTION TO ENGINEERING DRAWING**: Principles of Engineering Graphics and their significance.
- **INTRODUCTION TO COMPUTER AIDED DRAFTING**: Introduction to CAD software package commands-Free hand sketches of 2D-Creation of 2D by CAD package.

Unit-II

- **ENGINEERING CURVES**: Ellipse, Parabola, and Hyperbola (General Method only), Cycloids: Epicycloid, Hypocycloid.

Unit-III

- **ORTHOGRAPIC PROECTIONS**
- **PRINCIPLES OF ORTHOGRAPHIC PROJECTIONS**: conventions – first and third angle projections. Projections of points - Projection of lines inclined to both the planes. (First angle projection only)
- **PROJECTIONS OF PLANES**: Projections of regular planes, inclined to both planes.

Unit-IV

- **PROJECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**
- **PROJECTION OF SOLIDS**: Solids inclined to both planes
- **DEVELOPMENT OF SURFACES**: Theory of development, development of lateral surface along with base.

Unit-V

- **ISOMETRIC DRAWINGS**
- **ISOMETRIC VIEWS**: Divisions of pictorial projection, Theory of Isometric Drawing - Isometric view and Isometric projections; Drawing of Isometric circles, Dimensioning Isometric Objects
- Conversion of Isometric view to Orthographic views and Orthographic views to Isometric views.

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Computer Aided Engineering Drawing / K Balaveera reddy et al-CBS publishers
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

Reference Books:

1. D.M. Kulkarni, A.P.Rastogi, A.K. Sarkar “Engineering Graphics with AutoCAD” PHI publications, 2013
2. Sham Tickoo “ AutoCAD 2011: A Problem solving approach” Autodesk Press, USA.
3. Sham Tickoo, D. saravanan, “AutoCAD 2010 for engineers and designers” Dreamtech Press, 2010
4. Johle (2009), Engineering Drawing, Tata Mc Graw Hill, New Delhi, India.

I Year B.Tech. I/II Sem.

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(CH-106BS/CH-206BS) Engineering Chemistry Lab

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: 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

Experiment no. 9. Determination of viscosity of lubricant by using Ostwald Viscometer

Preparation

Experiment no. 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. 2. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
3. 3.College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

CS207ES DATA STRUCTURES LAB

B.Tech. I Year II Sem.

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Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:

- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments:

1. Write a program that uses functions to perform the following operations on singly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Quick sort ii) Heap sort iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv)AVLtrees v) Red - Black trees
9. Write a program to implement the graph traversal methods.

10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

TEXT BOOKS:

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

REFERENCE BOOK:

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

B.Tech. I Year II Sem.

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ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (R22)

(Common for CSE, ECE, IT, CSM, CSD & CSC)

COURSE CODE: EN108HS/EN208HS

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:

- Computer Assisted Language Learning (CALL)Lab
- 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 UniversityPress.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills-Lab Manual cum Workbook.* CengageLearning 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

I Year B.Tech. I/II Sem.

L	T	P	C
0	0	2	1

SD109BS/SD209BS: SKILL DEVELOPMENT COURSE
(APTITUDE AND LOGIC BUILDING)

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).

II YEAR I SEMESTER

S. No.	Course Code	CourseTitle	L	T	P	Credits
1	EC301ES	Analog & Digital Electronics	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	1	0	4
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	0	0	3
6	EC306ES	Analog & Digital Electronics 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 (Data Visualization-R Programming/ PowerBi)	0	0	2	1
10	*MC310	Environmental Science	2	0	0	0
Total Credits			**17**	**1**	**8**	**20**

II YEAR II SEMESTER

S. No	CourseCode	Course Title	L	T	P	Credits
1	SM401MS	Business Economics & Financial Analysis	3	0	0	3
2	IT402PC	Discrete Mathematics	3	0	0	3
3	IT403PC	Database Management Systems	3	0	0	3
4	CS404PC	Python Programming	3	0	0	3
5	CS405PC	Software Engineering	3	0	0	3
6	IT406PC	Database Management Systems Lab	0	0	2	1
7	CS407PC	Python Programming Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real Time Research Project/ Societal Related Project	0	0	2	1
10	SD410PC	Skill Development Course (Node JS\ React JS\ Django)	0	0	2	1
11	*MC411	Gender Sensitization Lab	0	0	2	0
Total Credits			15	0	12	20

***MC– Satisfied/Unsatisfied**

B.TECH II Year I Sem. **LT P C**

3 0 0 3

EC301ES:ANALOG AND DIGITAL ELECTRONICS

Common to IT and CSM

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 - clippingcircuits,comparators,Halfwaverectifier,Fullwaverectifier, 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 Emitterbias, 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, DeMorgan 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, Christos Halkias 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'soutline series*,1988.
2. Digital Principles, 3/e, Roger L.Tokheim, *Schaum'soutline series*,1994.

B.TECH II Year I Sem. **L T P C**

3 0 0 3

CS302PC:COMPUTER ORGANIZATION AND ARCHITECTURE

Common to CSE, IT, CSM and CSC

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 the ir impact on processor design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.
- Evaluate cost performance and design trade-off s 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

Micro programmed 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.

MultiProcessors : Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOKS:

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

REFERENCES:

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

B.TECH II Year I Sem. **L T P C**

3 0 0 3

CS303PC:OPERATING SYSTEMS

Common to CSE, IT, CSM, CSD and CSC

Prerequisites:

- A course on "Computer Programming and Data Structures".
- 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 the irrespective 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

OperatingSystem-Introduction,Structures-SimpleBatch,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, wait pid, exec

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

UNIT -III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Inter process Communication Mechanisms:** IPC between processes on a single computer system, IPC

between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT -IV

Memory Management and Virtual Memory-

Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT -V

File System Interface and Operations-

Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. OperatingSystemPrinciples-AbrahamSilberchatz,PeterB.Galvin,GregGagne7thEdition,
2. JohnWiley. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCEBOOKS:

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

Common to CSE,IT, CSM, CSD and CSC

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 interprocess 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 buzz words, datatypes, 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, auto boxing, 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, checkbox, 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, JFrame and JComponent,Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes,Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXTBOOKS:

1. Java the complete reference, 7thedition, Herbertschildt,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, Pearsone ducation.
4. An introduction to Java programming and object-oriented application development, R.A.Johnson- Thomson.
5. CoreJava2,Vol1,Fundamentals,Cay.S.HorstmannandGaryCornell,eighthEdition,Pearson Education.
6. CoreJava2,Vol2,AdvancedFeatures,Cay.S.HorstmannandGaryCornell, eighth Edition, Pearson Education
7. Object Oriented Programming with Java, R. Buyya, S.T. Selvi, X. Chu, TMH. Java and Object Orientation, an introduction, John Hunt, second edition,Springer 9 Maurach's Beginning 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 oflarge 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 anddifference of means and tests of hypothesis concerning to singleproportion 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:

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

Reference Books:

1. Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
2. 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

EC306ES: ANALOG AND DIGITAL ELECTRONICS LAB

Common to IT and CSM

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 universalates
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 I Sem. **L T P C**

0 0 2 1

CS307PC:OPERATING SYSTEMS LAB (Using UNIX/ LINUX)

Common to CSE, IT, CSM, CSD and CSC

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, inter process 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) Round Robin 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) FIFO 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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

B.TECH II Year I Sem **L T P C**

0 0 2 1

CS308PC: JAVA PROGRAMMING LAB

Common to CSE, IT, CSM,CSD and CSC

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.

Note:

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 Netbeans 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 Num 2 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 andanemptymethodnamedprintArea().Providethreeclassesnamed 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 subdirectories.

REFERENCE BOOKS:

1. JavaforProgrammers,P.J.DeitelandH.M.Deitel,10thEditionPearsoneducation.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D.S. Malikand, P. S.Nair, Cengage Learning.
4. CoreJava, Volume1,9thedition, CayS.Horstmannand G Cornell, Pearson.

B.TECH II Year I Sem. **LTPC**

0 0 2 1

SD309PC:Skill Development Course (DataVisualization-R Programming/ Power Bi) Common to CSE, IT, CSD and CSC

Course Objectives:

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

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, AVR, and Aggregate features, Creating custom calculations and fields.
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards ; Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
9. Tableau filetypes, 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, BrettPowell,2ndedition.
2. R Programming for Data Science by RogerD.Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India.

B.TECH II Year I Sem. **LTP C**

2 0 0 0

*MC310: ENVIRONMENTAL SCIENCE

Common to CSE, IT and ECE

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 plant community.
- **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**- c**onsumptive 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

REFERENCEBOOKS:

1. Environmental Studies–From crisis to cure by Dr. R. Rajagopaln
2. Textbook for Environmental science and Technology by M. Anji Reddy
3. Environmental engineering and Disaster management byK R.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.

B.TECH II Year II Sem. **L T P C**

3 0 0 3

SM401MS: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Common to CSE, IT and CSD

Prerequisites: None

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 McGrawHill, 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.

B.TECH II Year II Sem. **L T P C**

3 0 0 3

IT402PC: DISCRETE MATHEMATICS

Common to IT, CSD and CSC

Prerequisites: An understanding of Mathematics in general is sufficient.

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 Sub-graphs, 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.

TEXTBOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joel. Mott, Abraham Kandel, Teodore Paker, Prentis HallofIndia, 2nded.

REFERENCE BOOKS:

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

B. Tech II Year II Sem **L T P C**

3 0 0 3

IT403PC : DATABASE MANAGEMENT SYSTEMS

Common to IT and CSM

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, JohannesGehrke, *TataMcGraw Hill* 3rdEdition
2. Database System Concepts, Silberschatz, Korth, *McGrawhill*, V edition.

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. Shahand 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 t* Edition.

B.TECH II Year II Sem. **L T P C**

3 0 0 3

CS404PC : PYTHON PROGRAMMING

Common to CSE, IT and CSC

Course Objectives: This course will enable students to:

- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build Web Services and introduction to Network and Database Programming in Python.

Course Outcomes: The students should be able to:

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT-I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences-Strings, Lists, and Tuples, Mapping and Set Types

UNIT-II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions,

*Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sysModule, Related Modules.

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT-III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT-IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

UNIT– V

Database Programming: Introduction, Python Database Application Programmer's Interface(DB-API), Object Relational Managers (ORMs), Related Modules

Textbook

1. Core Python Programming, Wesley J.Chun, Second Edition, Pearson.

B.Tech II Year II Sem **L T P C**

3 0 0 3

CS405PC:SOFTWAREENGINEERING

Common to CSE , IT,CSM,CSD,CSC

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 carryout 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 patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

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.

System models: Context models, behavioral models, data models, object models, structured methods.

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 pat-

terns, 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.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT-V

Metrics for Process and Products: Software measurement metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

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, Apractitioner's Approach- Roger S.Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCES:

1. Software Engineering, an Engineering approach- James F.Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object- oriented design using UML Meilerpage- Jones: Pearson Education.
4. Software Engineering by K K Agarwal and Yogesh Singh 3rd Edition, New Age International.

B.TECH II Year II Sem. **L T P C**

0 0 2 1

IT406PC: DATABASE MANAGEMENT SYSTEMSLAB

Common to IT and CSM

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
- Acquires kills 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 McGraw Hill, 3rdEdition
2. Database System Concepts, Silberschatz, Korth,McGrawHill,Vedition.

REFERENCESBOOKS:

1. DatabaseSystemsdesign,Implementation,andManagement,PeterRob&CarlosCoronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate,*PearsonEducation*
3. Introduction to Database Systems, C.J.Date, *PearsonEducation*
4. Oracle for Professionals, TheXTeam, S.ShahandV.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, *WileyStudent Edition.*

B.TECH II Year II Sem. **L T P C**

0 0 2 1

CS407PC: PYTHON PROGRAMMING LAB

Common to CSE, IT and CSC

Pre-requisites: Students should install Python on Linux platform.

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: The lab experiments will be like the following experiment examples

Week-1:

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.

   ii)Start the Python interpreter and type help() to start the online help utility.

2. Start a Python interpreter and use it as a Calculator.3.

3. i) Write a program to calculate compound interest when principal, rate and number of periods are given.

   ii) Given coordinates(x1,y1),(x2,y2) find the distance between two points

4. Read name, address, email and phone number of a person through keyboard and print the details.

Week-2:

1. Print the below triangle using for loop.

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

2. Write a program to check whether the given input is digit or lower case character or upper case character or a special character (use 'if-else-

if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval(use break)

Week-3:

1. i) Write a program to convert a list and tuple into arrays.

   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest Common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week-4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has _duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

i). Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

ii). The word list I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

3.i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

ii) Remove the given word in all the places in a string?

iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4. Write a recursive function that generates all binary strings of n-bit length

Week-5:

1.i) Write a python program that defines a matrix and prints

ii) Write a python program to perform addition of two square matrices

iii) Write a python program to perform multiplication of two square matrices

2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a) Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

   b) Add an attribute named color to your Rectangle objects and modify draw_ rectangle so that it uses the color attribute as the fill color.

   c) Write a function called draw_point that takes a Canvas and a Point as arguments and draws are presentation of the Point on the Canvas.

   d) Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week-7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present init and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file file1 and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week-8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates–AND,OR,NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXTBOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W.Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

B.Tech. II Year II Sem **L T P C**

0 0 2 1

CS408PC:SOFTWARE ENGINEERING LAB

Common to CSE, IT, CSM, CSD, CSC

Prerequisite

- A course on "Programming for Problem Solving"
- A course on "Database Management Systems"

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

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1. Development of problem statement.
2. Preparation of Software Requirement Specification document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System

5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

TEXT BOOKS:

1. SoftwareEngineering,Apractitioner'sApproach-RogerS.Pressman,6th edition,McGrawHill International Edition.
2. SoftwareEngineering-Sommerville,7th edition,PearsonEducation.
3. The unified modeling languageuser guide Grady Booch, James Rambaugh,Ivar Jacobson,Pearson Education.

B.TECH II Year II Sem. **L T P C**

0 0 2 1

CS409PC: Real-time Research Project \ Societal Related Project

Common to CSE, IT, CSM, CSD and CSC

Guidelines will be followed as per JNTUH

B.TECH II Year II Sem. **L T P C**

0 0 2 1

SD410PC: Skill Development Course (NODEJS / REACTJS / DJANGO) Common to CSE, IT, CSD and CSC

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

- To implement the static web pages using HTML and do clients side validation using JavaScript.
- To design and work with data bases using Java
- To develop an end to end application using java full stack.
- To introduce NodeJS 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 Java Script.
- Demonstrate Advanced features of Java Script and learn about JDBC
- Develop Server–side implementation using Java technologies like
- Develop the server–side implementation using NodeJS.
- 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 openweather map.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 RESTAPI to perform CRUD operations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSONWeb 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.

REFERENCEBOOKS:

1. Jon Duckett, Beginning HTML,XHTML,CSS, andJavaScript,WroxPublications,2010
2. BryanBasham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, ProMERNStack,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**

0 0 2 0

*MC411: GENDER SENSITIZATION LAB (An Activity-based Course)

Common to CSE, IT and ECE

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 critical 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 labour and its relationto 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:GENDERROLESAND 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 ANDLABOUR

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 Violencefrom a Human Rights Perspective-Sexual Harassment: SayNo! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. RebuildingLives. ThinkingaboutSexualViolenceBlamingtheVictim-"IFoughtformy Life…."

UNIT– V:GENDER ANDCULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and PopularLiterature-GenderDevelopmentIssues-GenderIssues-GenderSensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals MaryKomandOnler.LoveandAcidjustdonot-Mix.LoveLetters.Mothersand 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, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu**published by**

TeluguAkademi, Telangana Government in 2015.

ASSESSMENT AND GRADING

- Discussion & Classroom Participation: 20%
- Project/Assignment:30%
- EndTermExam:50%

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credit s
1	IT501PC	Data Communications and Computer Networks	3	0	0	3
2	IT502PC	Design and Analysis of Algorithms	3	1	0	4
3	CS503PC	Artificial Intelligence	3	0	0	3
4	IT504PC	Devops	3	0	0	3
5		Professional Elective-I	3	0	0	3
6	CS505PC	Computer Networks Lab	0	0	2	1
7	CS506PC	Artificial Intelligence Lab	0	0	2	1
8	EN506HS	Advanced Communication Skills Lab	0	0	2	1
9	SD512PC	Skill Development Course-V(UI Design-Flutter)	0	0	2	1
10	*MC509	Constitution of India	2	0	0	0
Total Credits			**17**	**1**	**8**	**20**

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credit s
1	IT601PC	Automata Theory and Compiler Design	3	1	0	4
2	CS602PC	Machine Learning	3	0	0	3
3	IT603PC	Internet Of Things	3	0	0	3
4		Professional Elective– II	3	0	0	3
5		Open Elective -I	3	0	0	3
6	CS604PC	Machine Learning Lab	0	0	2	1
7	IT605PC	Internet Of Things Lab	0	0	2	1
8	CS607PROJ	Industrial Oriented Mini Project/Internship	0	0	0	2
9	*MC608	Intellectual Property Rights	2	0	0	0
10	*MC610	Cyber Security	2	0	0	0
Total Credits			**19**	**1**	**4**	**20**

***MC– Satisfied/Unsatisfied**

B.Tech. III Year I- Sem **L T P C**

3 0 0 3

IT501PC:Data Communications and Computer Networks

Course Objectives:

- Explore basic concepts of data communication
- Introduce students to TCP/IP and OSI models along with the merits and demerits.
- Explore in detail services offered by various layers of OSI Model.
- Understand link layer protocols, UDP, TCP and application layer protocols.

Course Outcomes:

- Understand and explore the basics of communication and computer networks
- Understand datalink, network and transport layers concepts of a computer network.
- Understand the working of application layer protocols.

UNIT–I

- **Data Communications:** Components–Direction of Dataflow–Networks– ComponentsandCategories–TypesofConnections–Topologies–Protocolsand Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN **Physicallayer:**Transmissionmodes,Multiplexing,TransmissionMedia,Switching,CircuitSwitchedNetworks,DatagramNetworks,VirtualCircuitNetworks.

UNIT–II

- **Datalinklayer:**Introduction,Framing,andError–DetectionandCorrection–Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN– Ethernet IEEE 802.3, IEEE 802.5– IEEE 802.11, Random access, Controlled access, Channelization.

UNIT–III

- **Network layer:** Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

UNIT–IV

- **Transport Layer:** Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion,CongestionControl, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

UNIT–V

- **Application Layer:** Domain name space, DNS in Internet, Electronic Mail, SMTP, FTP, WWW, HTTP,SNMP.

TEXTBOOKS:

1. Data Communications and Networking, Behrouz A.Forouzan, Fourth Edition TMH.

REFERENCE BOOKS:

1. Computer Networks, Andrew S Tanenbaum, 6th Edition. Pearson Education.
2. Computer Networking: A Top-Down Approach Featuring the Internet. James F.Kurose & Keith W.Ross, 3rdEdition, Pearson Education
3. Data communications and Computer Networks, P.C Gupta, PHI.
4. AnEngineeringApproachtoComputerNetworks,S.Keshav,2ndEdition,Pearson Education.

B.Tech III Year I Sem **L T P C**

3 1 0 4

IT502PC: DESIGN AND ANALYSIS OF ALGORITHMS

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branchand bound methods) and mention problems for which each technique is appropriate;
- Describe show 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:

- Analyze the performance of algorithms
- Choose appropriate data structures and algorithm design methods for a specified application
- Understand the choice of data structures and the algorithm design methods

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, Mergesort, Strassen's matrix multiplication.

UNIT-II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heap sort **Backtracking:** General method, applications, n-queen's problem, sum ofsubsets problem, graph Coloring, Hamiltonian cycles.

UNIT-III

DynamicProgramming: Generalmethod,applications-Optimalbinarysearchtree, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT-IV

Greedymethod:Generalmethod,applications-Jobsequencingwithdeadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.**BasicTraversaland-**

SearchTechniques: TechniquesforBinaryTrees,Techniques for Graphs, Connected components, Biconnected components.

UNIT-V

BranchandBound:Generalmethod,applications-Travellingsalespersonproblem, 0/1 knapsackproblem- LCBranchand Bound solution,FIFO Branch and Boundsolution. **NP-Hard and NP-Complete problems**: Basic concepts, non-deterministic algorithms, NP - Hard andNP-Complete classes, Cook's theorem.

TEXTBOOK:

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

REFERENCEBOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction toAlgorithms, secondedition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHIPvt.Ltd./PearsonEducation.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

B.Tech. III Year I-Sem **L T P C**

3 0 0 3

CS503PC:ARTIFICIAL INTELLIGENCE

(Common to CSE/IT)

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,Uniformcost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, **Informed (Heuristic) Search Strategies:** Greedybest-first search,A*search,HeuristicFunctions,BeyondClassical 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, OptimalDecisionsinGames,Alpha–BetaPruning,ImperfectReal-TimeDecisions.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, Hornclauses 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 withDefault 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 Norvig, Pearson Education.

REFERENCEBOOKS:

1. Artificial Intelligence, 3rdEdn, E.Richand K .Knight (TMH)
2. Artificial Intelligence, 3rdEdn., Patrick Henry Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems– Patterson, Pearson Education

B.Tech. III Year I-Sem **L T P C**

3 0 0 3

IT504PC: Devops

Prerequisites: Software Engineering, Software Testing Methodology.

Course Objectives: The main objectives of this course are to:

- Describe the agile relationship between development and IT operations.
- Understand the skillsets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

Outcomes: Onsuccessfulcompletionofthiscourse,studentswillbeableto:

- Identify components of Devops environment.
- Describe Software development models and architectures of DevOps.
- Apply different project management, integration, testing and code deployment tool.
- Investigate different DevOps Software development models.
- Assess various Devops practices.
- Collaborate and adopt Devops in real-time projects.

UNIT-I

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

UNIT- II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. **DevOps influence on Architecture:** Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT- III

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS:

1. JoakimVerona. Practical Devops, Second Edition. Ingrams horttitle; 2nd edition (2018). ISBN-10: 1788392574
2. DeepakGaikwad,ViralThakkar.DevOpsToolsfromPractitioner'sViewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOK:

1. LenBass, Ingo Weber, LimingZhu. DevOps: A Software Architect's Perspective. AddisonWesley; ISBN-10.

B. Tech III Year I Sem **L T P C**

3 0 0 3

IT511PE: Biometrics

(Professional Elective – I)

Prerequisites:

1. Data structures

Course Objectives:

- Will learn the biometric technologies.
- Learn the computational methods involved in the biometric systems.
- Learn methods for evaluation of the reliability and quality of the biometric systems.

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

1. Identify the various Biometric technologies.
2. Design of biometric recognition for the organization.
3. Develop simple applications for privacy.
4. Understand the watermarking techniques of biometrics.
5. Understand the research on biometric techniques.
6. Understand the need of biometric in the society.

UNIT - I

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems,Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods

UNIT - II

Face Biometrics & Retina And Iris Biometrics Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences,Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics.

UNIT -III

Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages.

UNIT - IV

Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition For Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System,Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disad-

vantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

UNIT - V

Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics: Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, PrivacyConcerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms ofPrivacy, Soft Biometrics - Introduction to Biometric Cryptography.

TEXT BOOKS:

1. G r Sinha and Sandeep B. Patil, Biometrics: concepts and applications, Wiley, 2013.
2. Paul Reid, Biometrics for Network Security, Pearson Education.

REFERENCE BOOKS:

1. Samir Nanavathi, Micheal Thieme and Raj Nanavathi, Biometrics, Identity verification in anetworked world, Wiley, dream Tech.
2. John D. Woodward and Jr. Wiley Dreamtech, Biometrics, The Ultimate Reference.

Online websites / Materials:

1. https://www.biometricsinstitute.org
2. https://www.tutorialspoint.com/biometrics/biometrics_quick_guide.htm

B. Tech III Year I Sem **L T P C**

3 0 0 3

IT512PE/ CS504PC: Data Mining

(Professional Elective – I)(Common to CSE, IT, CSM)

Pre-Requisites:

1. Database Management System
2. Probability and Statistics

Course Objectives:

- Students will become acquainted with both the strengths and limitations of various data miningtechniques like Association, Classification, Cluster and Outlier analysis.

Course Outcomes:

- Understand the need of data mining and pre-processing techniques.
- Perform market basket analysis using association rule mining.
- Utilize classification techniques for analysis and interpretation of data.
- Identify appropriate clustering and outlier detection techniques to handle complex data.
- Understand the mining of data from web, text and time series data.

UNIT - I

Introduction to Data Mining:

What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing**:** Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformationand Data Discretization.

UNIT - II

Association Analysis: Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

UNIT - III

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed- Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

UNIT - IV

Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density- Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detec-

tion, and Overview of Outlier Detection Methods

UNIT - V

Advanced Concepts: Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition,Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, PearsonEducation, India, 2006.

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

B. Tech III Year I Sem **L T P C**

3 0 0 3

IT513PE: Principle of Programming Languages

(Professional Elective – I)

Prerequisites

1. A course on "Mathematical Foundations of Computer Science".
2. A course on "Computer Programming and Data Structures".

Course Objectives

- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation
- Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logicprogramming languages; and scripting languages

Course Outcomes

- Acquire the skills for expressing syntax and semantics in formal notation
- Identify and apply a suitable programming paradigm for a given computing application
- Gain knowledge of the features of various programming languages and their comparison

UNIT - I

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence Expressions and Statements, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode

Assignment Control Structures — Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, **Coroutines Implementing Subprograms:**General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

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

UNIT - IV

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency.

Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java,

Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily ImperativeLanguages, Comparison of Functional and Imperative Languages

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

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

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.

B. Tech III Year I Sem **L T P C**

3 0 0 3

CS514PE: Computer Graphics

(Professional Elective – I) (Common to CSE,IT, CSD)

Prerequisites:

- Familiarity with the theory and use of coordinate geometry and of linear algebra such asmatrix multiplication.
- A course on "Computer Programming and Data Structures"

Course Objectives

- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes

- Acquire familiarity with the relevant mathematics of computer graphics.
- Be able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications

UNIT – I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and workstations and input devices Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid-point circle and ellipse algorithms Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT – II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland – Hodgeman polygon clipping algorithm.

UNIT – III

object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT – IV

Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT – V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner andHughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

B.Tech. III Year I Sem **L T P C**

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CS505PC: COMPUTER NETWORKS LAB

(Common to CSE/CSM)

Course Objectives

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

Course Outcomes

- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- 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 bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broad cast 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 technique use din buffers.
10. Wireshark
    - i. Packet Capture Using Wireshark
    - ii. Starting Wireshark
    - 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

B.Tech III Year I-Sem **L P T C**

0 0 2 1

CS506PC: ARTIFICIAL INTELLIGENCE LAB

Course Objectives:

1. Become familiar with basic principles of AI toward problem solving, knowledge representation, and learning.

Course Outcomes:

1. Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.

LISTOF EXPERIMENTS

Write a Program to Implement the following using Python.

1. Breadth First Search
2. Depth First Search
3. Tic-Tac-Toe game
4. 8-Puzzle problem
5. Water-Jug problem
6. Travelling Salesman Problem
7. Tower of Hanoi
8. Monkey Banana Problem
9. Alpha-Beta Pruning
10. 8-QueensProblem

TEXTBOOK:

1. Artificial Intelligence a Modern Approach, Third Edition, Stuart Russel land Peter Norvig, Pearson Education.

REFERENCEBOOKS:

1. Artificial Intelligence, 3rdEdn, E.RichandK.Knight (TMH)
2. Artificial Intelligence, 3rdEdn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.

B.Tech III Year I Sem **L T P C**

0 0 2 1

SD512PC: Skill Development Course-V (UI Design-Flutter)

(Common to CSE/CSM/ IT/ECE/ME)

Course Objectives:

- To learn installation of SDK of Flutter, Xcode and Android Emulator
- Understanding Stateless and Stateful Widgets and Widget Tree
- Learning of Dartbasics
- Application of Animation to app.

Course Outcomes:

- Knowledge on installation of various softwares.
- Understanding of various Widgets
- Application of Animation to 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 Widget and Element Trees, Stateful Widget and Element Trees, Installing theFlutter 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, Get the FlutterSDK,CheckforDependencies, Install Android Studio,Set Up the Android Emulator, Installing on Linux, System Requirements, Get the Flutter SDK, Check for Dependencies, Install Android Studio, Set Up the Android Emulator, Configuring the Android Studio Editor.

UNIT-II Creating a Hello World App

Setting Up the Project, Using Hot Reload, Using Themes to Style Your App, Using a 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, if and else, ternary operator, for Loops, while and do-while, while and break, continue, switch and case, Using Functions, Import Packages, Using Classes, Class Inheritance, Class Mixins, 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.

REFERENCE BOOKS:

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

B.Tech III Year I Sem **L T P C**

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MC509:CONSTITUTION OF INDIA

(Common to CSE/CSM/IT/ECE/ME)

Course objective:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.
- Tounderstandthecentralandstaterelation,financialandadministrative.

Course Outcome:

- Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration.
- Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy
- Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
- Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however,it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution ofIndia reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use ofsovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reformsin the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static”

and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played anhistoric role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of Indiaanditshistoric contributions has been recognized throughout the world and it gradually made it “as one of the strongestcourt in the world”.

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy– Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 2

B.Tech.III Year II-Sem **LTPC**

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IT601PC: AUTOMATA THEORY AND COMPILER DESIGN

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, typechecking 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.
- stratetheknowledgeofpatterns,tokens&regularexpressionsforlexical 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.

- Non deterministic Finite Automata: Formal Definition, an application, Text Search,
- Finite Automata with Epsilon-Transitions.
- **Deterministic Finite Automata:** Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without€-transitions. Conversion of NFA to DFA

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, Leftmost 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's 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

TEXTBOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science- Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry 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
5. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

B.Tech. III Year II Sem. **L T P C**

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CS602PC: MACHINE LEARNING

(Common to CSE/CSD/CSM)

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 ensembler to increase the classification accuracy

UNIT-I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task–Concept Learning as Search–Finding a Maximally Specific Hypothesis–Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT-II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layerPerceptroninPractice–ExamplesofusingtheMLP–Overview–DerivingBack- Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT-III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K meansAlgorithms

UNIT-IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis –Independent Component Analysis – Locally Linear Embedding – Isomap – Least SquaresOptimization

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, Chapmanand Hall/ CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell,—Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach,—Machine Learning: The Art and Science of Algorithms that Make Sense of Data, FirstEdition, Cambridge University Press, 2012.
3. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
4. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

B.Tech. III Year II Sem. **L T P C**

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IT603PC: INTERNET OF THINGS
(COMMON TO CSE/ CSM)

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT-I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II

IoT and M2M – Software defined networks, network function virtualization, difference between SD-NandNFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III

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

UNIT-IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controllingoutput, reading input from pins.

UNIT-V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXTBOOKS:

1. Internet of Things- A Hands- on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759

B. Tech III Year II Sem **L T P C**

3 0 0 3

CS621PE: Network Programming and Management

(Professional Elective – II) (Common to CSE,IT)

Course Objectives: The student should be made to:

- Learn the basics of socket programming using TCP Sockets.
- Learn about Socket Options.
- Learn to develop Macros for including Objects In MIB Structure.
- Understand SNMPv1, v2 and v3 protocols & practical issues.

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

- Develop programs using TCP Sockets.
- Use Socket Options.
- Develop Macros for including Objects In MIB Structure.
- Use SNMPv1, v2 and v3 protocols

UNIT- I

ELEMENTARY TCP SOCKETS

Introduction to socket programming – Overview of TCP / IP protocols – Introduction to sockets – Socket address structures – Byte ordering functions – Address conversion functions– Elementary TCP sockets – Socket – Connect – Bind – Listen – Accept – Read– Write – Close functions – Iterative server – Concurrent server.

UNIT- II

APPLICATION DEVELOPMENT

TCP echo server – TCP echo client – POSIX signal handling – Server with multiple clients

– Boundary conditions– Server process crashes– Server host crashes – Server crashes and reboots – Server shutdown – I/O multiplexing – I/O models – Select function – Shutdown function – TCP echo server (with multiplexing) – Poll function – TCP echo client (with multiplexing)

UNIT- III

SOCKET OPTIONS, ELEMENTARY UDP SOCKETS

Socket options – Get socket and set socket functions – Generic socket options – IP socket options–ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo server – UDP echo client – Multiplexing TCP and UDP sockets – Domain Name System

– Get host byname function – IPV6 support in DNS – Get host byadr function – Getserv byname and getserv by port functions.

UNIT- IV

ADVANCED SOCKETS

IPV4 and IPV6 interoperability – Threaded servers – Thread creation and termination– TCP echo server using threads – Mutexes – Condition variables – Raw sockets – Raw socket creation – Raw socket output – Raw socket input – Ping program – Trace route program.

UNIT- V

SIMPLE NETWORK MANAGEMENT

SNMP network management concepts – SNMP management information – Standard MIB's

– SNMP V1 protocol and practical issues – Introduction to RMON, SNMP V2 and SNMPV3.

TEXT BOOKS:

1. W. Richard Stevens, "UNIX Network Programming Vol-I", Third Edition, PHI Pearson Education, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Pearson Edition, 2009.

REFERENCE BOOKS:

1. D.E. Comer, "Internetworking with TCP/IP Vol- III: Client-Server Programming and Application BSD Sockets Version", Second Edition, Pearson Edition, 2003.

B. Tech III Year II Sem **L T P C**

3 0 0 3

CS622PE: Natural Language Processing

(Professional Elective – II) (Common to CSE,IT)

Prerequisites:

1. Data structures and compiler design

Course Objectives:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating
- empirical NLP systems
- Manipulate probabilities, construct statistical models over strings and trees, and estimate
- parameters using supervised and unsupervised training methods.
- Design, implement, and analyze NLP algorithms; and design different language modeling
- Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges,

Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches,

Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic
Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues Semantic Parsing I: Introduction,

Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parame-

ter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.
2. atural Language Processing and Information Retrieval: Tanvier Siddiqui, U.

B. Tech III Year II Sem **L T P C**

3 0 0 3

IT623PE: Full Stack Development

(Professional Elective – II)

COURSE OBJECTIVES:

1. To learn the core concepts of both the frontend and backend programming course.
2. To get familiar with the latest web development technologies.
3. To learn all about databases.
4. To learn complete web development process
5. To provide an in-depth study of the various web development tools

COURSE OUTCOMES:

1. Develop a fully functioning website and deploy on a web server.
2. Gain Knowledge about the front end and back end Tools
3. Find and use code packages based on their documentation to produce working results in a project.
4. Create web pages that function using external data.
5. Gain an understanding about the databases

UNIT - I:

Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git & Github HTML, CSS

UNIT - II:

Frontend Development: Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.

UNIT - III:

REACT JS: Introduction to React React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

UNIT - IV:

Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application using Maven

UNIT - V:

Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL)

Data persistence

using Spring JDBC Agile development principles and deploying application in Cloud

TEXT BOOKS:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon
3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BY AZAT MARDAN

REFERENCE BOOKS:

1. Full-Stack JavaScript Development by Eric Bush.
2. Mastering Full Stack React Web Development Paperback – April 28, 2017 by Tomasz Dyl , Kamil Przeorski , Maciej Czarnecki

B. Tech III Year II Sem

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IT624PE: Real Time Systems
(Professional Elective – II)

Prerequisite: Basic Programming/C/C++ Programming, Computer Organization and Operating System

Course Objectives

- To provide a broad understanding of the requirements of Real Time Operating Systems.
- To make the student understand, applications of these Real Time features using casestudies.

Course Outcomes:

- Understand the key concepts of Real-Time systems.
- To facilitate task scheduling and designing concurrency within an application using Semaphores, Message queues.
- Explore other kernel objects common to embedded system development.
- Attain knowledge of exception and interrupt handling in real time systems
- Understand real time operating systems like RT Linux, VxWorks, MicroC /OSII, TinyOs

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT - V

Case Studies of RTOS: RT Linux, MicroC/OS-II, VxWorks, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
2. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.

REFERENCE BOOKS:

1. Advanced UNIX Programming, Richard Stevens
2. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

B.Tech. III Year II Sem. **L T P C**

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CS604PC: MACHINE LEARNING LAB

(Common to CSE/CSM/CSD)

Course Objective:

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

Course Outcomes:

- Understand modern notions in 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 ML application 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 (MiniProject)

TEXTBOOK:

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

REFERENCEBOOK:

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

B.Tech. III Year II Sem. **L T P C**

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IT605PC: INTERNET OF THINGS LAB

Following are some of the programs that a student should be able to write and test on an Raspberry Pi, but not limited to this only.

Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man,mkdir,rmdir, tar, gzip,cat,more,less, ps,sudo,cron,chown,chgrp,ping etc.

Run some python programs on Pilike:

1. Read your name and print Hello message with name
2. Read two numbers and print their sum, difference, product and division. Word and character count of a given string
3. Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input
4. Print a name 'n' times, where name and n are read from standard input, using for and while loops. Handle Divided by Zero Exception.
5. Print current time for 10 times with an interval of 10 seconds. Read a file line by line and print the word count of each line.
    - Light an LED through Python program
    - Get input from two switches and switch on corresponding LEDs
    - Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
    - Flash an LED based on cron output(acts as an alarm)
    - Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
    - Get the status of a bulb at a remote place (on the LAN) through web.

The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

B.Tech. III Year II Sem.

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EN606HS:AdvancedCommunicationSkillsLab

B.Tech. III Year II Sem. **L T P C**

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*MC608:INTELLECTUAL PROPERTY RIGHTS

(Common to CSE/CSM/IT/ECE/ME)

COURSE OBJECTIVE:

- Understanding, defining and differentiating different types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness.
- rstandingtheFrameworkofStrategicManagementofIntellectualProperty(IP).
- Appreciating and appraising different IP management (IPM) approaches and describing how pioneering firms initiate, implement and manage IPM programs,
- Explaining how to derive value from IP and leverage its value in new product and service
- Development Exposing to the Legal management of IP and understanding of real life practice of IPM

COURSEOUTCOME:

- Identify different types of Intellectual Properties(IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
- Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
- Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technology development.
- Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
- Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
- Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;

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

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

UNIT–IV

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

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT–V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, International patent law, and international development in trade secrets law.

TEXTBOOKS

1. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
2. S.V.Satakar ,“ Intellectual Property Rights and Copy Rights, Ess Ess Publications, NewDelhi,2002

REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	IT701PC	Data Analytics	3	0	0	3
2	IT702PC	Information Security	3	0	0	3
3		Professional Elective-III	3	0	0	3
4		Professional Elective-IV	3	0	0	3
5		Open Elective-II/ MOOCS	3	0	0	3
6	IT703PC	Data Analytics using R Lab	0	0	3	1.5
7	IT704PC	Information Security Lab	0	0	3	1.5
8	IT705PROJ	Project-I	0	0	6	3
9						
Total Credits			**15**	**0**	**12**	**21**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective-V	3	0	0	3
2		Professional Elective-VI	3	0	0	3
3		Open Elective-III/MOOCS	3	0	0	3
4	IT801PROJ	Seminar	0	0	2	1
5	IT802PROJ	Project-II	0	0	18	9
Total Credits			**9**	**0**	**20**	**19**

B.Tech. IV Year I Sem. **L T P C**

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IT701PC:Data Analytics

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.
- Apply Data Analysisor Statistical Analysis
- Design Data Architecture for Analysis.
- Differentiate between Supervised and Unsupervised Learning
- Analyze Various Sources of Data.

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

TEXTBOOKS:

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

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbachand Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zakiand W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

B.Tech.IV Year I Sem **L T P C**

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IT702PC: Information Security

Prerequisites

1. A Course on "Computer Networks and a course on Mathematics

Course Objectives

- To understand the fundamentals of Cryptography
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world applications

Course Outcomes

- Demonstrate the knowledge of cryptography, network security concepts and applications.
- Ability to apply security principles in system design.
- Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT-I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security

Classical Encryption Techniques: DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, TrafficConfidentiality, key Distribution, Random Number Generation.

UNIT-II

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange,Elliptic Curve Cryptography.

Message authentication and Hash Functions: Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT-III

Digital Signatures: Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service.

Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT-IV

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security

Payload, Combining Security Associations and Key Management.

WebSecurity:WebSecurityRequirements,SecureSocketLayer(SSL)andTransportLayer Security(TLS), Secure Electronic Transaction (SET).

UNIT-V

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

TEXTBOOK:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

B. Tech IV Year I Sem **L T P C**

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IT731PE: Social Media Security

(Professional Elective – III)

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: Altshuler Y, EloviciY, Cremers A.B, Aharony N, Pentland A. (Eds.)
2. **Social media security** **https://www.sciencedirect.com/science/article/pii/**

B97815974998660000

REFERENCE BOOKS:

1. Michael Cross, Social Media Security Leveraging Social Networking While Mitigating Risk
2. Online Social Networks Security, Brij B. Gupta, Somya Ranjan Sahoo, Principles, Algorithm,Applications, and Perspectives, CRC press

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CS732PE/ IT732PE /AI701PC: Deep Learning
(Professional Elective – III) (Common to CSE,IT,CSM,CSC)

Course Objectives:

- To understand deep Learning algorithms and their applications in real-world data

Course Outcomes:

- Understand machine learning basics and neural networks
- Understand optimal usage of data for training deep models
- Apply CNN and RNN models for real-world data
- Evaluate deep models
- Develop deep models for real-world problems

UNIT -I

Machine Learning Basics: Learning Algorithms, Capacity, Over fitting and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning

Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT -II

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 Tying and Parameter Sharing, Sparse Representations,Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

UNIT-III

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

UNIT -IV

Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies

for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long- Term dependencies, Explicit Memory

UNIT -V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

TEXT BOOK:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

REFERENCE BOOKS:

1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G., H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

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IT733PE/DS744PE: Software Project Management

(Professional Elective – III) (Common to IT, CSD)

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:

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

- 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

B. Tech IV Year I Sem

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IT734PE/AI733PE: Image Processing

(Professional Elective -III)(Common to IT, CSM)

Prerequisites

- Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge ofdigital signal processing is desirable.
- A course on "Computational Mathematics"
- A course on "Computer Oriented Statistical Methods"

Course Objectives

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes

- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration andcompression techniques.

UNIT - I

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT - II

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering,Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, LeastMean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Threshold-

ing, Region Oriented Segmentation.

UNIT - V

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:

1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education, 2nd Ed, 2004.

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wiley, 3rd Edition, 2004.

B.Tech. IV Year I Sem

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IT741PE: Cyber Security
(Professional Elective -IV)

Course Objectives:

This course makes the students to understand the basic concepts security policies, interpretsecurity objectives, various catalog approaches, analyze cyber user, conflict, management, infrastructure issues, investigate various case studies on cyber security policies.

Course Outcomes:

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

1. Explore various security policies and evolution of security.
2. Investigate more on various catalog approaches and cyber security objectives.
3. Analyze cyber user and conflict issues.
4. Review cyber management and infrastructure issues.
5. Examine various case studies on cyber security policies.

UNIT - I

Introduction to Cybercrime: Introduction, Cyber crime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, 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, MobileDevices: 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, Key loggers and Spywares, Virus and Worms, Trojan Horseand Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT - V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPRissues, 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 BOOK:

1. **Cyber Security:** Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, WileyINDIA.

REFERENCE BOOKS:

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. CRCPress T&FGrou

B.Tech. IV Year I Sem

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CS742PE: Semantic Web and Social Networks
(Professional Elective - IV) (Common to CSE,IT)

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 Outcomes

- Ability to understand and knowledge representation for the semantic web.
- Ability to create ontology.
- Ability to build a blogs and social networks.

UNIT – I

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.

UNIT – II

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.

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

UNIT –III

Logic, Rule and Inference Engines. Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

UNIT – IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods, What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

UNIT – V

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 interscience,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, Rudi Studer, Paul 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 W eb, T.Segaran, C.Evans, J.Taylor,O'Reilly, SPD.

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IT743PE: Software Metrics and Measures

(Professional Elective – IV)

Course Objectives:

1. Understand the basic techniques of data collection and how to apply them
2. Learn software metrics that define relevant metrics in a rigorous way.

Course Outcomes:

1. Perform some simple statistical analysis relevant to software measurement data.
2. Use from practical examples both the benefits and limitations of software metrics for quality-control and assurance

UNIT - I

Measurement Theory: Fundamentals of measurement – Measurements in Software Engineering – Scope of Software metrics – Measurement theory – Goal based framework – Software measurement validation.

UNIT - II

Data Collection And Analysis: Empirical investigation – Planning experiments – Software metrics data collection – Analysis methods – Statistical methods.

UNIT - III

Product Metrics: Measurement of internal product attributes – Size and structure – External product attributes – Measurement of quality.

UNIT - IV

Quality Metrics: Software quality metrics – Product quality – Process quality – Metrics for software maintenance – Case studies of Metrics Program – Motorola – HP and IBM.

UNIT - V

Management Metrics: Quality management models – Rayleigh Model – Problem Tracking report (PTR) model – Reliability growth model – Model evaluation – Orthogonal defect classification.

TEXT BOOKS

1. Software Metrics, Normal. E – Fentor Shari Lawrence Pfllegar, International Thomson Computer Press, 1997.
2. Software Metrics ; A Rigorous approach Fenter Norman, E., Chapmen & Hall, London.

REFERENCE BOOKS:

1. Metric and Models in Software Quality Engineering, Stephen H.Kin, Addison Wesley, 1995.
2. Measuring Software Process, William. A. Florac and Aretitor D Carletow, Addison –Wesley, 1995.

B. Tech IV Year I Sem **L T P C**

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IT744PE: Information Retrieval Systems

(Professional Elective – IV)

Prerequisites:

1. Data Structures

Course Objectives:

- To learn the concepts and algorithms in Information Retrieval Systems
- To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems.

Course Outcomes:

- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduc-

tion to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT - V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms,Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK:

1. 1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval by Yates and Neto Pearson Education.

B.Tech. IV Year I Sem **L T P C**

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IT703PC: Data Analytics using R Lab

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

- Relate data analytics for business decisions and strategy.
- Describe data analysis/ statistical analysis
- Implement standard data visualization and formal inference procedures
- Demonstrate Associations among features
- Implement different Classification Methods.

List of Experiments:

1. Introduction to data analytics
2. Basic Statistical and Visualization of Data Analytics
3. K-means Clustering
4. Implement Association Rules
5. Implement Linear Regression
6. Implement Logistic Regression
7. Implement Naive Bayesian Classifier
8. Implement the Decision Trees
9. Simulate Principal component analysis
10. Simulate Singular Value Decomposition

B.Tech. IV Year I Sem **L T P C**
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IT704PC: Information Security Lab

Course Objectives

- To understand the fundamentals of Cryptography
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world applications

Course Outcomes

- Demonstrate the knowledge of cryptography, network security concepts and applications.
- Ability to apply security principles in system design.
- Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

List of Experiments:

1. Implementation of symmetric cipher algorithm (AES and RC4)
2. Random number generation using a subset of digits and alphabets.
3. Implementation of RSA based signature system
4. Implementation of Subset sum
5. Authenticating the given signature using the MD5 hash algorithm.
6. Implementation of Diffie-Hellman algorithm
7. Implementation of the ELGAMAL cryptosystem.
8. Implementation of Goldwasser-Micali probabilistic public key system
9. Implementation of Rabin Cryptosystem. (Optional).
10. Implementation of Kerberos cryptosystem
11. Implementation of a trusted secure web transaction.
12. Digital Certificates and Hybrid (ASSY/SY) encryption, PKI.
13. Message Authentication Codes.
14. Elliptic Curve cryptosystems (Optional)

TEXTBOOK:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

B. Tech IV Year II Sem **L T P C**

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IT851PE/CS851PE: Blockchain Technology

(Professional Elective – V)

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 consensusmechanisms.
- To understand the public block chain system, Private block chain system and consortiumblockchain.
- 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. Crypto currency — Bit coin, Alt coin and Token: Introduction, Bit coin and the Crypto currency, Crypto currency Basics, Types of Crypto currencies, Crypto currency Usage.

UNIT-II

Public Blockchain System: Introduction, Public Blockchain, Popular Public Block chains, The bit coin Blockchain, Ethereum Blockchain.

Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of SmartContracts, 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, ByzantineFault, 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 anICO, 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 ofBlockchain 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, BasicProgramming Using Python, Python Packages for Blockchain.

Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger FabricNetwork, 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.

B. Tech IV Year II Sem

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CS852PE : Mobile Application Development

(Professional Elective - V) (Common to CSE,IT)

Prerequisites

1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives

- To demonstrate their understanding of the fundamentals of Android operating systems
- To improves their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobileplatform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes

- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Student will be able to develop, deploy and maintain the Android Applications.

UNIT - I

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

UNIT – I I

Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to

dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

B. Tech IV Year II Sem

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CS853PE: Design Patterns

(Professional Elective - V) (Common to CSE,IT)

Prerequisites:

- A Course on Software Engineering"
- A Course on "Object Oriented Programming Through Java"

Course Objectives:

- The aim of the course is to appreciate the idea behind Design Patterns in handling common problems faced during building an application
- This course covers all pattern types from creational to structural, behavioral to concurrency and highlights the scenarios when one pattern must be chosen over others.

Course Outcomes:

- Create software designs that are scalable and easily maintainable
- Understand the best use of Object Oriented concepts for creating truly OOP programs
- Use creational design patterns in software design for class instantiation
- Use structural design patterns for better class and object composition
- Use behavioral patterns for better organization and communication between the objects
- Use refactoring to compose the methods for proper code packaging
- Use refactoring to better organize the class responsibilities of current code

UNIT - I

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

UNIT - II

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

UNIT - III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT - IV

Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT - V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

TEXT BOOKS:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCE BOOKS:

1. Pattern's in Java, Vol –I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

B. Tech IV Year II Sem

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IT854PE: Speech Recognition

(Professional Elective - V)

Course Objective:

1. To study the speech signals, speech science, acoustic phonetics, discrete-time linear predictive (LPC) models, short-term analysis of speech signals, speech feature extraction and modeling for speech recognition, robustness issues in Automatic Speech Recognition (ASR), speech recognition principles (hidden Markov models), and special topics in human-computer interfaces (Spoken Document Retrieval, Speech Recognition for In Vehicle Route Navigation), speaker recognition and verification.

Course Outcome:

1. Understand speech recognition principles, methods, models and implementation.
2. Apply speech recognition principles &methods to characterize the speech signal and to recognize the speech.
3. Apply the Pattern Comparison Techniques and Hidden Markov Models to recognize the speech.
4. Analyse the speech recognition methods, pattern comparison techniques and Hidden Markov Models.
5. Identify the human speech communications, phonetics, linguistics, acoustic phonetics, Waveform, Digital Models and Basic Problems of Speech Processing

Unit I:

Introduction to Speech Processing, human and machine speech production: Models for speech production. Various types of speech sounds and their characteristics

Unit II

Speech hearing: Mechanism for human hearing: Learning to recognize human sounds, acquired knowledge vs vocabulary - based methods.

Unit III

Analysis of speech: Frequency and time domain based methods: FFT, computation of pitch, spectrograms, LPC, cepstrum, ZCR, etc. Representation of acoustic events.

Components of a Speech recognition system: Input, feature analysis, modelling and decision rule, vocabulary.

Unit IV

Data compression: Vector Quantization, codebook design, Lloyd's quantizer design, K-means algorithm, LBG algorithm for speech. Speech modeling.

Unit V

Stochastic processes: Markov processes, Hidden Markov modelling. Components of an HMM, training and building of HMMs: Viterbi algorithm, Baum-Welch algorithm, etc. Implementation of a speech recognition system: Time/space consideration, designing the interface, self-learning mechanism.

Texts:

1. L. Rabiner and B. H. Juang, Fundamentals of Speech Recognition, Prentice Hall, 1993.
2. L. Rabiner and R. W. Schafer, Digital Processing of Speech Signals, Prentice Hall, 1978.
3. K. Sayood, Introduction to Data Compression, 2nd Ed, Morgan Kaufmann, 2000.

References:

1. D. O'Shaughnessy, Speech Communications: Human and Machine, 2nd Ed, IEEE Press, 2000.
2. A. Gersho and R. M. Gray, Vector Quantization and Signal Compression, Kluwer Academic, 1991.

B. Tech IV Year II Sem

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IT861PE: Ethical Hacking

(Professional Elective - VI)

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 the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models;
- Information Security Program; Business Perspective; Planning a Controlled Attack; Frameworkof Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes:

1. Gain the knowledge of the use and availability of tools to support an ethical hack
2. Gain the knowledge of interpreting the results of a controlled attack
3. Understand the role of politics, inherent and imposed limitations and metrics for planning of a test 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: Intutive 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, Overal 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

B.Tech. IV Year II -Sem

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CS863PE/ IT862PE: Cloud Computing
(Professional Elective - VI) (Common to CSE,IT)

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

Security in Cloud Computing, and Advanced Concepts in Cloud Computing

TEXT BOOK:

1. Chandrasekaran, K. Essentials of cloud computing. CRC Press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg,Andrzej M.Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

B.Tech. IVYearII Sem

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IT863PE:SOFTWARETESTINGMETHODOLOGIES

(Professional Elective-VI)

Prerequisites

1. Software Engineering

Course Objectives

- Toprovideknowledgeoftheconceptsinsoftwaretestingsuchastestingprocess,criteria,strategies,andmethodologies.
- Todevelopskillsinsoftwaretestautomationandmanagementusingthelatesttools.

Course Outcomes:

- Understand purpose of testing and path testing
- Understand strategies in dataflow testing and domain testing
- Develop logic-based test strategies
- Understand graph matrices and its applications
- Implement test cases using any testing automation tool

UNIT-I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II

- TransactionFlowTesting:transactionflows,transactionflowtestingtechniques.
- DataFlowtesting:Basicsofdataflowtesting,strategiesindataflowtesting,applicationofdataflowtesting.
- DomainTesting:domainsandpaths,Nice&uglydomains,domaintesting,domainsandinterfacestesting,domainandinterfacetesting,domainsandtestability.

UNIT-III

Paths,PathproductsandRegularexpressions:pathproducts&pathexpression,reductionprocedure,applications,regularexpressions&flow anomaly detection.

LogicBasedTesting:overview,decisiontables,pathexpressions,kvcharts,specifications.

UNIT-IV

State,StateGraphsandTransitiontesting:stategraphs,good&badstategraphs,statetesting,Testabilityt-

ips.

UNIT-V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix-,nodereductionalgorithm,buildingtools.(StudentshouldbegivenanexposuretoatoollikeJmeter/selenium/soapUI/Catalon).

TEXTBOOKS:

1. Software Testing techniques-Baris Beizer, Dreamtech,secondedition.
2. Software Testing Tools–Dr. K.V.K. K.Prasad,Dreamtech.

REFERENCEBOOKS:

1. The craft of software testing-BrianMarick,PearsonEducation.
2. Software Testing Techniques–SPD(Oreille)
3. Software Testing in the Real World–EdwardKit,Pearson.
4. Effective methods of Software Testing,Perry,JohnWiley.
5. Art of SoftwareTesting–Meyers,JohnWiley.

B.Tech. IV Year II-Sem

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CS864PE/AI853PE:COMPUTERVISION

(Professional Elective-VI) (Common to CSE,IT, CSM)

Course Objectives:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand three-dimensional image analysis techniques.
- To understand motion analysis.
- To study some applications of computer vision algorithms.

Course Outcomes: Up on completion of this course, the students should be able to

- Implementfundamentalimageprocessingtechniquesrequiredforcomputervision.
- Perform shape analysis.
- Implement boundary tracking techniques.
- Apply chain codes and other region descriptors.
- Apply Hough Transform for line, circle, and ellipse detections.
- Apply 3Dvision techniques.
- Implement motion related techniques.
- Develop applications using computer vision techniques.

UNIT-I

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

UNIT-II

Shapes and Regions: Binary shape analysis–connectedness–object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles –handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors–regiondescriptors–moments.

UNIT-III

Hough Transform: Line detection – Hough Transform (HT) for line detection – foot-of- normal method –line localization – line fitting – RANSAC for straight line detection – HT based circular object

detection–accurate center location – speed problem – ellipse detection – Case study: Human Iris location– hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection –object location–GHTforfeaturecollation.

UNIT-IV

3D Vision and Motion: Methods for 3D vision – projection schemes – shape from shading –photometric stereo – shape from texture – shape from focus – active range finding – surface re presentations – point-based representation – volumetric representations – 3D object recognition – 3Dreconstruction–introductiontomotion–triangulation–bundleadjustment–translational-alignment–parametricmotion–spline-basedmotion–opticalflow–layeredmotion.

UNIT-V

Applications: Application: Photo album – Face detection – Face recognition – Eigen faces – Active-appearanceand3DshapemodelsoffacesApplication:Surveillance–foreground-backgroundseparation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras–humangaitanalysis Application: In-vehiclevisionsystem:locatingroadway–roadmarkings –identifying road signs–locating pedestrians.

TEXT BOOKS:

1. Simon J.D. Prince, – Computer Vision: Models, Learning, and Inference,CambridgeUniversity-Press,2012.
2. Mark Nixonand Alberto S.Aquado, – FeatureExtraction & Image Processingfor Computer Vision,Third Edition, Academic Press, 2012.
3. E.R. Davies, – Computer & Machine Vision, Fourth Edition, Academic Press,2012.

REFERENCES:

1. D.L.Baggioetal., – Mastering Open CV with Practical Computer Vision Projects, Packt Publishing, 2012.
2. Jan Erik Solem, – Programming Computer Visionwith Python: Toolsandalgorithmsforanalyzingimages, O'Reilly Media, 2012.
3. R.Szeliski, – Computer Vision: Algorithmsand Applications, Springer2011.

Open Elective-I

IT611OE	Introduction to Python Programming
IT612OE	Database Management Systems
IT613OE	Cyber Security

Open Elective-II

IT721OE	Introduction to Web Programming
IT722OE	Operating Systems
IT723OE	Artificial Intelligence

Open Elective-III

IT831OE	Java Programming
IT832OE	Web Services
IT833OE	Ethical Hacking

IT611OE: INTRODUCTIONTOPYTHONPROGRAMMING

(Open Elective –I)

B.Tech. III Year II Sem. **L TP C**
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- **Course Objectives**: This course will enable students to
- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build Web Services and introduction to Network and Database Programming in Python.

Course Outcomes:

- The students should be able to Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create,runandmanipulatePythonProgramsusingcoredatastructureslikeLists,DictionariesanduseRegularExpressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Data-bases in Python.

UNIT-I:

- Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built in Functions, Categorizing the Standard Types, Unsupported Types
- Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules
- Sequences-Strings, Lists, and Tuples, Mapping and SetTypes

UNIT-II:

- Files: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, RelatedModules
- Exceptions:ExceptionsinPython,DetectingandHandlingExceptions,ContextManagement,
- *Exceptionsas Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules
- **Modules:** Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Mod-ule-Built-in Functions, Packages, Other Features of Modules

UNIT-III:

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded

Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

UNIT-IV:**GUIProgramming:** Introduction,Tkinterand Python Programming, BriefTourof Other GUIs, Related Modulesand Other GUIs

WEBProgramming: Introduction, WedSurfingwith Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web(HTTP)Server functions and their applications.

UNIT-V:

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API),Object Relational Managers(ORMs),Related Modules

TEXTBOOKS:

1. Core Python Programming, Wesley J.Chun, Second Edition, Pearson.

IT612OE : DATA BASE MANAGEMENT SYSTEMS

(Open Elective –I)

B.Tech. III Year II Sem. **L T P C**

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Course Objectives:

- To underst and the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics included at a 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 transactionprocessing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT-I

- **Introduction:** Database System Applications, Purpose of Database Systems,View of Data base Languages–DDL,DML,Relational Databases, Database
- Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators,History of Database Systems.
- **Introduction to Database design:**Database Design and ER diagrams, Entities, Attributes and
- Entity sets, Relationships and Relationship sets, Additional features of ER Model,Conceptual Design with the ER Model, Conceptual Design for Large enterprises.
- **Relational Model:** Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design: ER to Relational, Introduction to Views, Destroying/Altering Tables and Views.

UNIT-II

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus,Domain relational calculus,Expressive Power of Algebra and calculus.

SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Neste Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases..

UNIT-III

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies Reasoning about FDs, Normal Forms,Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

UNIT-IV

Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction IsolationLevels,Implementation of Isolation Levels.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols,Validation-Based Protocols, Multiversion Schemes. Recovery System-Failure Classification, Storage,Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of non volatile storage, Early Lock Release and Logical Un do Operations, Remote Back up systems.

UNIT-V

StorageandIndexing: Over view of Storage and Indexing: Data on External Storage,File Organizationand Indexing, Index Data Structures, Comparison of File Organizations.

Tree structural indexinge : Intuition of tree indexes, Indexed Sequential Access Method(ISAM), B+Trees: A Dynamic Index Structure,Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs Linear-Hashing.

TEXT BOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, Mc Graw Hill Eduation (India) Private Limited, 3rd Edition. (Part of UNIT-I, UNIT-II, UNIT-III, UNIT-V)
2. Database System Concepts, A.Silberschatz, Henry.F.Korth, S.Sudarshan, Mc Graw Hill Education (India) Private Limitedl, 6th edition. (Part of UNIT-I, UNIT-IV)

REFERENCE BOOKS:

1. DatabaseS ystems, 6th edition, RElmasri, Shamkant B.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C.J. Date, Pearson Education.

IT613 OE: CYBER SECURITY

(Open Elective –I)

B.Tech. III Year II Sem. **LT PC**

3 0 0 3

Course Objectives:

This course makes the students to understand the basic concepts security policies, interpret security objectives, various catalog approaches, analyze cyber user, conflict, management, infrastructure issues, investigate various case studies on cyber security policies.

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

- Explore various security policies and evolution of security.
- Investigate more on various catalog approaches and cyber security objectives.
- Analyze cyber user and conflict issues.
- Review cyber management and infrastructure issues.
- Examine various case studies on cyber security policies.

Unit-1:

Introduction to Cyber crime: Introduction, Cyber crime and Information Security, Who are Cyber-criminals, Classifications of Cyber crimes, Cyber crime: The legal Perspectives and Indian Perspective, Cyber crime and the Indian ITA 2000, A Global Perspective on Cyber crimes.

Unit- II:

Cyber Offenses : How Criminals Plan Them : Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cyber crimes, Bot nets : The Fuel for Cyber crime, Attack Vector, Cloud Computing

Unit-III:

Cyber crime: 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 Cyber crime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Back doors, Steganography, DoS and DdoS attacks, SQL Injection, Buffer Overflow.

Unit-V:

Cyber Security: Organizational Implications, Introduction, Cost of Cyber crimes 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. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina God boleandSunilBelapure, Wiley INDIA.

REFERENCE TEXTBOOKS:

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

IT721 OE: INTRODUCTION TO WEB PROGRAMMING

(Open Elective–II)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives:

- Understand the technologies used in Web Programming.
- Know the importance of object-oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web-based application using sockets.

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

- Design web pages.
- Use technologies of Web Programming.
- Apply object-oriented aspects to Scripting.
- Create databases with connectivity using JDBC.
- Build web-based application using sockets.

UNIT –I

Web page Designing using HTML, Scripting basics-Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built- in functions- Browser object model - Verifying forms.-HTML5-CSS3-HTML5canvas-Websitecreationusingtools

UNIT-II

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schem as, Document Object Model, XHTML Parsing XML Data-DOM and SAX Parsers in java.

UNIT-III

Introduction to Scripts and Scripting: Characteristics and uses of scripting languages, Introduction to PERL, Names and values, Variables and assignment, Scalar expressions, Control structures, Built in functions, Collections of Data, Working with arrays, Lists and hashes, Simple input and output, Strings, Patterns and regular expressions, Sub routines, Scripts with arguments.

UNIT-IV

Client side Scripting: Introduction to Java script: Java script language-declaring variables, scope of variables, functions, event handlers (on click, on submit etc.), Document Object Model, Form validation. Simple AJAX application.

UNIT–V

Introduction to PHP: Declaring variables, data types ,arrays ,strings, operators, expressions, control

structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MYSQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening,-closing,reading,writing,appending,deletingetc.ontextandbinaryfiles,listingdirectories

TEXTBOOKS:

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java- The Complete Reference, 7th Edition. Tata Mc Graw-Hill Edition.
3. Michael Morrison XML Unleashed Techmedia SAMS.

REFERENCETEXTBOOKS:

1. John Pollock, Java script – A Beginners Guide, 3rd Edition–-Tata Mc Graw–Hill Edition.
2. Keyur Shah, Gate way to Java Programmer Sun Certification, Tata Mc Graw Hill,2002.

IT722 OE:OPERATING SYSTEMS

(Open Elective–II)

B.Tech. IV Year I Sem. **L TPC**

3 0 0 3

Pre requisites:

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

Course Objectives:

- Provide an introduction to operating system concepts (i.e. processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O sub systems 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, inter process 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 computer 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-1:

Operating System - Introduction, Structures - Simple Batch, Multi programmed, Time- shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Unit- II:

Process and CPU Scheduling-Process concepts and scheduling,Operations on processes, Cooperating Processes,Threads,and Interprocess Communication, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.System call interface for process management-fork,exit, wait,waitpid,exec

Unit-III:

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock Process Management and Synchronization - The Critical Section Problem, Synchronization Hard-ware, 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, IOC system calls.

TEXTBOOKS:

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

REFERENCETEXTBOOKS:

1. Operating Systems–InternalsandDesignPrinciplesStallings,FifthEdition–2005,PearsonEd-ucation/PHI
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals-The New Frontiers, U.Vahalia, Pearson Education.

IT723 OE:ARTIFICIAL INTELLIGENCE

(Open Elective–II)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Prerequisites:

- A course on “Computer Programming and Data Structures”
- A course on “Advanced Data Structures”
- A course on “Design and Analysis of Algorithms”
- A course on “Mathematical Foundations of Computer Science”
- Some background in linear algebra, data structures and algorithms, and probability will all behelpful

Course Objectives:

- To learn the distinction between optimal reasoning Vshuman like reasoning
- To understand the concepts of states pacerepresentation,exhaustivesearch,heuristicsearchtogetherwiththetimeandspacecomplexities.
- To learn different knowledge presentation techniques.
- To understand the applications of AI, namely game playing, the or emproving, and machine learning.

Course Outcomes:

- Ability to formulate an efficient problem space for a problem express edin natural language.
- Select a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem.
- Possess the ability to apply AI techniques to solve problems of game playing ,and machine learning.

Unit-I:

Introduction: AI problems, Agents and Environments,Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction(Back tracking, Local Search)

Unit- II:

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Min-imax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

Unit-III:

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesi an Networks

Unit-IV:

Learning: What Is Learning? Rote Learning, Learning by Taking Advice,Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

Unit-V:

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOKS:

1. Russell, S. and Norvig, P.Artificial Intelligence: A Modern Approach,Third Edition,Prentice Hall,2010.

REFERENCE TEXT BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B.Nair, The Mc GrawHill publications,Third Edition,2009.
2. GeorgeF.Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving,Pearson Education,6thed.,200

IT831 OE:JAVA PROGRAMMING

(Open Elective–III)

B.Tech. IV Year II Sem. **LTPC**

3 0 0 3

Course Objectives:

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism ;and demonstrate how they relate

To the design of abstract classes

- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception and lingand multithreading.
- To introduce the design of Graphical User Inter face using applets and swing controls.

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop appletsforwebapplications.
- AbletodesignGUIbasedapplications

UNIT-I

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding,Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An OverviewofJava,Datatypes,Variables and Arrays, operators, expressions,control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Mul-tilevel hierarchy, super uses, using final with inheritance, Polymorphism- adhoc polymorphism, pure polymorphism, method overriding, abstract classes, Objectclass, forms of inheritance - specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT-II

Packages- Defining a Package, class path, Access protection, importing packages. Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io) – The Stream Classes-Byte streams and Character streams, Reading console Input and Writing Console Output,File class,Reading and writing Files,Random access file operations, The Console class, Serialization, Enumerations, auto boxing,

UNIT-III

Exception handling- Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements,throw, throws and finally,built- in exceptions, creating own exception sub classes.

Multi threading- Differences between thread-based multi tasking and process-based multi tasking,- Java thread model,creating threads,thread priorities,synchronizing threads,inter thread communication.

UNIT-IV

The Collections Framework (java. util)- Collections overview, Collection Interfaces, The Collection classes-Array List,Linked List,Hash Set,Tree Set,Priority Queue,Array Deque.Accessing a Collection via an Iterator, Using an Iterator, The ForEach alternative, Map Interfaces and Classes, Comparators,Collection algorithms,Arrays,The Legacy Classes and Interfaces - Dictionary,Hashtable,Properties,Stack,Vector

MoreUtilityclasses,StringTokenizer,BitSet,Date,Calendar,Random,Formatter,Scanner

UNIT - V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components,- containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout,GridBagLayout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes,Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

AS imple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls -JLabel and Image Icon, JText Field, The Swing Buttons- JButton, JToggle Button,JCheckBox, JRadio Button,JTabbed Pane,JScroll Pane,JList,JCombo Box,Swing Menus,Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, HerbertS childt, Mc Graw Hill Education(India)Pvt.Ltd.
2. Understanding Object Oriented Programming with Java, updated edition, T.Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and designusing Java,J.Nino and F.A.Hosch,JohnWiley&sons
2. Introduction to Java programming, Y.DanielLiang, Pearson Education.
3. Object oriented Programming through Java, P.Radha Krishna,University Press.
4. Programming in Java, S.Malhotra, S.Chudhary, 2nd edition, oxford Univ.Press.
5. Java Programming and object oriented Application Development, R.A.Johnson, Cengage Learning.

IT832 OE:WEB SERVICES

(Open Elective–III)

B.Tech. IV Year II Sem. **LTPC**

3 0 0 3

Course Objectives:

- To understand the details of web services technologies like WSDL,UDDI,SOAP
- To learn how to implement and deploy web service client and server
- To explore inter operability between different frameworks

Course Outcomes:

- Basic details of WSDL,UDDI,SOAP
- Implement WS client and server with interoperable systems

Unit-1:

Evolution and Emergence of Web Services - Evolution of distributed computing, Core distributed-computing technologies – client/server, CORBA, JAVA RMI, Microsoft DCOM, MOM, Challenges in-DistributedComputing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture(SOA).

Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

Web Services Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication models, basic steps of implementing web services.

Unit- II:

Fundamentals of SOAP – SOAP Message Structure, SOAP encoding, Encoding of different datatypes, SOAP message exchange models, SOAP communication and messaging ,Java and Axis, limitations of SOA

Unit-III:

Describing Web Services – WSDL– WSDL in the world of Web Services, Web Services lifecycle,

Anatomy of WSDL definition document, WSDL bindings ,WSDL Tools, limitations of WSDL.

Unit-IV:

Discovering Web Services – Serviced is covery,role of serviced is covery in a SOA, serviced is covery mechanisms, UDDI – UDDI registries, uses of UDDI Registry, Programming with UDDI, UDDI datastructures, Publishing API, Publishing, searching and deleting information in a UDDI Registry, limitations of UDDI.

Unit-V:

Web Services Inter operability– Means of ensuring Interoper ability, Overview of .NET, Creating a.NET client for an Axis Web Service, creating Java client for a Web service ,Challenges in Web Services

Interoper ability.

Web Services Security – XML security framework, Goals of Cryptography, Digital signature, Digital Certificate, XML Encryption.

TEXTBOOKS:

1. Developing Java Web Services,R.Nagappan,R.Skoczylas,R.P.Sriganesh,Wiley India.

REFERENCE TEXT BOOKS:

1. Java Web Service Architecture ,James Mc Govern ,Sameer Tyagietal., Elsevier
2. Building Web Services with Java,2ndEdition, S.Graham and others ,Pearson Edn
3. Java Web Services , D.A.Chappell & T.Jewell, O'Reilly,SP
4. Web Services ,G .Alonso ,F. Casatiand others ,Springer.

IT833 OE : ETHICA LHACKING

(Open Elective–III)

B.Tech. IV Year II Sem. **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; In-formation Security Program; Business Perspective Planning a Controlled Attack; Framework of Steps (Reconnaissance,Enumeration,VulnerabilityAnalysis,Exploitation,DeliverableandIntegration)

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, Multiphased Attacks,Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, LawEnforcement

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, Root Kits, 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

TEXTBOOK:

1. JamesS.Tiller,“TheEthicalHack:AFrameworkforBusinessValuePenetration Testing ”,Auerbach Publications, CRCP ress

REFERENCE BOOKS:

1. EC-Council,“Ethical Hacking and Counter measures Attack Phases”,Cengage Learning
2. Michael Simpson, Kent Backman, James Corley,“Hands-On Ethical Hacking and Network Defense ”, Cengage Learning