CHALAPATHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(Accredited by NBA, NAAC with 'A' grade, Approved AICTE & Affiliated to ANU)

(An ISO 9001-2015 Certified Institution)

Chalapathi Nagar, LAM, Guntur-522 034, Andhra Pradesh, INDIA

(Autonomous)

Scheme of Instruction, Examination & Detailed Syllabi of

Computer Science & Engineering

(Artificial Intelligence and Machine Learning)

4-Year B.Tech
R-20 Regulations
Semester System

With effect from 2020 – 2021
(from the batch admitted in the year 2020)

About the College

Chalapathi Institute of Engineering and Technology always plays pivot role about the welfare and the indispensible requirements of engineering aspirants with a cutting edge vision. Sri Y.V.Anjaneyulu, Chairman of Chalapathi Educational Society established Chalapathi Institute of Engineering & Technology, Lam in Guntur. It is strategically situated between Guntur city and Amaravathi.

The Campus is situated in 20 acres covered with gorgeous green environment offering pleasant quality education and research. The college is placed in an independent and voluminous buildings constructed as per the norms and specifications of AICTE, New Delhi.

The burning object of the college is to provide well equipped infrastructure like Laboratories, spacious seminar halls, separate hostels for both boys and girls, canteen, Play ground having good ambience, language labs etc. This makes the students to concentrate on academic learning which provides quality education with ethics in holistic environment.

The college is affiliated to Acharya Nagarjuna University and recognized by AICTE, New Delhi. It offers four year B.Tech courses in CE, CSE, CSE-AI, CSE-DS, CSIT, ECE & EEE and M.Tech courses in CSE and VLSI & ESD.

COLLEGE VISION

To emerge as an Institute of Excellence for Engineering and Technology and provide quality education, entrepreneurial and research opportunities to the students in catering the needs of society.

COLLEGE MISSION

To be a student centric institute imbibing experiential, innovative and lifelong learning skills with academic rigor.

To Produce graduates who are knowledgeable, innovative and empathetic.

To inculcate entrepreneurial attitude and values amongst Learners.

QUALITY POLICY

Chalapathi Institute of Engineering and Technology is committed to achieve appropriate standards and excellence of teaching, research and consultancy by ensuring creative environment with challenging and entrepreneurial opportunities.

About the Department

Department of Computer Science and Engineering with Artificial Intelligence offers UG Program Computer Science and Engineering with Artificial Intelligence with 60 intake from Academic year 2020-21 .

DEPARTMENT VISION

To be centre of excellence by producing competent computer professionals with strong domain skills and research in Artificial intelligence oriented to solve societal problems

DEPARTMENT MISSION

Mission 1: To impart strong foundation in concepts of CSE and Artificial Intelligence

Mission 2: To promote research orientation through industry institution interaction

Mission 3: To provide value added training and skill for employability, research and innovation to solve real world problems of society.

PROGRAM EDUCATIONAL OBJECTIVES

PEO I:

Ability to understand, apply, analyze, and design models and applications in the key domains of Computer Science and Engineering with Artificial Intelligence.

PEO II :

To engage the students in life-long learning, to enhance their career positions in IT industries and related interdisciplinary research areas.

PEO III:

To familiarize the students with the ethical issues in engineering profession, nurturing of emerging technologies.

Curricular Framework for Regular and Honors B. Tech Programmes of all Branches

1. Eligibility for admission: As prescribed by Govt. of Andhra Pradesh from time to time.
2. Award of the Degree: A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:
   i. Pursues a course of study in not less than four and not more than eight academic years.
   ii. After eight academic years from the year of their admission, he/she shall forfeit their seat in B. Tech course and their admission stands cancelled.
   iii. Registers for 160 credits and must secure all the 160 credits.
   iv. A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.
3. Structure of the Undergraduate Engineering program:

Every course of B. Tech. Program shall be placed in one of the nine categories as listed in table below:

S.No.	Category	Code	Suggested breakup of Credits (APSCHE)	Suggested breakup of Credits (AICTE)
1	Humanities and social science including Management courses	HSMC	10	12
2	Basic Science courses	BSC	21	25
3	Engineering science courses	ESC	24	24
4	Professional core Courses	PCC	51	48
5	Open Elective Courses	OEC	12	18
6	Professional Elective Courses	PEC	15	18
7	Internship, seminar, project wok	PROJ	17	15
8	Mandatory courses	MC	Non-credit	Non-credit
9	Skill Oriented Courses	SC	10	-
	Total Credits		160	160

4. Assigning of Credits:

   1 Hr. Lecture (L) per week - 1 credit
   1 Hr. Tutorial (T) per week - 1 credit
   1 Hr. Practical (P) per week - 0.5 credits
   2 Hours Practical (Lab)/week - 1 credit

5. There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., shall be included in the guidelines issued by AICTE.

6. All undergraduate students shall register for NCC/NSS activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

7. Courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

8. Universities/Institutions may swap some of the courses between first and second semesters to balance the work load.

9. The concerned Board of studies can assign tutorial hours to such courses wherever it is necessary, but without change in the total number of credits already assigned for semester.

10. There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits, wherever lab component is involved it shall be (2-0-2) and without lab component it shall be (3-0-0). If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component.

11. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme.

12. A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the Programme. Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BOS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

13. The college shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength.
14. Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme. There shall also be mandatory full internship in the final semester of the Programme along with the project work.
15. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.
16. Under graduate Degree with Honors/Minor shall be issued by the University to the students who fulfill all the academic eligibility requirements for the B. Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.
17. **Assessment:** The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory as well as for practical subject. The distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Semester Examinations. A student has to secure not less than 35% of marks in the end semester examination and minimum 40% of marks in the sum total of internal and end semester examination marks to earn the credits allotted to each course.
    i. A student who could not secure a minimum of 50% aggregate from mid-term examination marks is not eligible to appear for the semester end examination and shall have to repeat the semester.
    ii. For theory subjects, during the semester there shall be two midterm examinations. The weightage of internal marks 30 consists of sessional – 18, Assignment – 12. The assignment examination is for 45 minutes duration conducted for 12 marks and the descriptive examination is for 90 minutes duration conducted for 18 marks.

    ***Note 1.** The assignment test shall contain 6 questions of equal weightage and student is asked to answer any two questions randomly and shall be considered for 12 marks, any fraction rounded off to the next higher marks.

    ***Note 2.** The sessional examination shall contain 3 questions out of which first question covers 50% of the syllabus with six one mark questions and compulsory, remaining two questions (6 marks of each) having internal choice and shall be considered for total 18 marks. Any fraction rounded off to the next higher marks.

iii. **Internal Marks can be finalized with 80% weightage for best of the two mids and 20% weightage for other Mid Exam. As the syllabus is framed for 5 units, the 1st midterm examination is conducted in 50% of the syllabus and 2nd midterm examination is in the rest of the syllabus of each subject in a semester.**

iv. For practical subjects there shall be continuous evaluation during the semester for 30 internal marks and 70 end examination marks. The internal 30 marks shall be awarded as follows: day to day work-10 marks, Record-10 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

v. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the Marks for 10 can be calculated with 80% weightage for best of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.

vi. For the seminar/Internship, Each student has to be evaluated based on the presentation of any latest topic with report of 10-15 pages and a PPT of min 10 slides. The student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

vii. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee

18. Attendance Requirements:

i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

iii. Condonation for shortage of attendance in aggregate up to 10% (65% and

above and below 75%) in each semester may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end semester examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the college. (a) A student is eligible to write the University examinations if he acquires a minimum of 50% in each subject and 75% of attendance in aggregate of all the subjects.

19. Promotion Rules:

a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirements.

b) A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year II semesterfrom all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

20. Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Marks Range	Level	Letter Grade	Grade Point
≥ 90	Outstanding	A+	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
< 40	Fail	F	0
-	Absent	Ab	0

Calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

Where, C_i is the number of credits of the i^{th} subject and G_i is the gradepoint scored by the student in the i^{th} course

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where 'S_i' is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.

v. *Grade Point:* It is a numerical weight allotted to each letter grade on a 10-point scale.

vi. *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E and F.

vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:

Equivalent Percentage = (CGPA – 0.50) x 10

Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he/she shall be placed in one of the following:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

21. Gap - Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at Institute level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

Curricular Framework for Mandatory Internships

1. Two summer internships each with a minimum of six weeks duration, done at the end of second and third years, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs.

2. Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 30% and 70% weightages respectively.

3. In the final semester, the student should mandatorily undergo internship and parallelly he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.

4. The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

Curricular Framework for Skill oriented

1. For skill oriented/skill advanced course, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.
2. Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature. (See Annexure 1 for model skill courses)
3. A pool of interdisciplinary job-oriented skill courses shall be designed by a common Board of studies by the participating departments/disciplines and the syllabus along with the pre requisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.
4. The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies as approved by the concerned BOS.
5. The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.
6. If a student chooses to take a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency/professional bodies as approved by the Board of studies.
7. If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.
8. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the University/Academic Council.

Curricular Framework for Honors Programme

1. Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.
2. A student shall be permitted to register for Honors program at the beginning of 4th Semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of 2nd semesters without any backlogs. In case of the declaration of the 3rdsemester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.
3. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.
4. In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
5. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.
6. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
7. The concerned BOS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.
8. Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the Annexure-2)

9. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the university/academic council.

10. The concerned BOS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

11. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
12. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

13. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

Curricular Framework for Minor Programme:

1. a) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

   b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
2. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.
3. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.
4. There shall be no limit on the number of programs offered under Minor. The University/Institution can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.
5. The concerned BOS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
6. A student shall be permitted to register for Minors program at the beginning of 4^{th} semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) upto the end of 2^{nd} semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4^{th} semester. If a student fails to acquire 8 SGPA upto 3^{rd} semesters or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

7. A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
8. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BOS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
9. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the university/academic council.
10. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BOS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.
11. A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BOS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.
12. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

13. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

14. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

INDUSTRIAL COLLABORATIONS (CASE STUDY)

University-Industry linkages refer to the interaction between firms and universities or public research centers with the goal of solving technical problems, working on R&D, innovation projects and gathering scientific as well as technological knowledge. It involves the collaboration of Industries and Universities in various areas that would foster the research ecosystem in the country and enhance growth of economy, industry and society at large.

The Universities/Institutions (Autonomous) are permitted to design any number of Industry oriented minor tracks as the respective BOS feels necessary. In this process the Universities/Institutions can plan to have industrial collaborations in designing the minor tracks and to develop the content and certificate programs. Industry giants such as IBM, TCS, WIPRO etc., may be contacted to develop such collaborations. The Universities/Institutions shall also explore the possibilities of collaborations with major Industries in the core sectors and professional bodies to create specialized domain skills.

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ANNEXURE 1

(MODEL ONLY)

SKILL, JOB ORIENTED TRACKS

1. BoS chairman concerned can add more subjects/tracks as per the availability of individual department needs.
2. Two skill-oriented subjects will be from the Domain knowledge only.
3. One skill subject shall be communication skills (including laboratory)
4. Remaining two skill subjects will be from the same domain/interdisciplinary/Industry relevant subjects as per the choice of the student.
5. Pre requisites and eligibility can be decided by the concerned BoS.

SKILL, JOB ORIENTED TRACKS FOR MECHANICAL ENGINEERING

1. **Design/Analysis/Simulation**- CAD, UGNX, Solid Works, Ansys, FEA, CATIA, CREO etc
2. **Production/Manufacturing-** CAM, Piping, A/QC, CNC
3. **Thermal/Computational-** Computational Fluid Dynamics, MATLAB etc
4. **Service Sector-** Industrial Safety and Management, Operation Research, Oil & Gas safety.

SKILL, JOB ORIENTED TRACKS FOR CIVIL ENGINEERING

1. **Structural Design**- AutoCAD 2D 3D, ANSYS Civil, ETABS, PRO Steel, etc.
2. **Building Design**- Revit Architecture, ANSYS Civil, STAAD.PRO, AECOsim etc.
3. **Land survey** - Surveying, 2D Drafting, 3D Modeling, Analysis,
4. **Transportation Design**- Road & Transport Design etc.

SKILL, JOB ORIENTED TRACKS FOR COMPUTER SCIENCE & Engineering

1. **Animation course**- VFX, CARTOONING, ANIMATION DESIGN etc
2. **Mobile app development-** App design for IOS and Android etc.
3. **Data Science-** Natural language processing, sentiment analysis, fore casting, regression models etc
4. **Python programming-** Deep learning, IOT natural language processing,Game Graphics Programming etc..

ANNEXURE 2

MODEL FOR HONORS

Note:

1. The subjects opted for Honors should be Advanced type which are not covered in regular curriculum.
2. Students has to acquire 16 credits with minimum one subject from each pool. (04 courses @4 credits
3. Concerned BoS can add or delete the subjects as per the decision of the board.
4. Pre requisites to be defined by the board for each course.
5. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

(MODEL FOR HONORS**)**

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING WITH ARTIFICIAL INTELLIGENCE					
S.NO.	**COURSE NAME**	**L-T-P**	**CR**	**PRE-REQ.**	**OFFERED TO**
POOL-1					
1	Data Mining and Data Warehousing				CSM
2	Object Oriented Modeling and Design				CSM
3	Cryptography and Network Secuirty				CSM
4	Network Security and Cyber Law				CSM
POOL-2					
1	Mobile Application Development				CSM
2	Introduction to Data Structures and Algorithms				CSM
3	Python Application Programming				CSM
4	Soft Computing				CSM
POOL-3					
1	Software Architecture and Design Patterns				CSM
2	Advanced JAVA and J2EE				CSM
3	Storage Area Networks				CSM
4	High Performance Computing				CSM
POOL-4					
1	Machine Learning				CSM
2	Natural Language Processing				CSM
3	Perception and Computer Vision				CSM
4	Multi Agent Systems				CSM

Annexure-3(a)

GENERAL MINOR TRACKS (MODEL ONLY)

Note

1. The student can opt any 4 subjects from each pool. (04 courses@4credits each)
2. Concerned BoS can add or delete the subjects as per the decision of the board.
3. Pre requisites to be defined by the board for each course.
4. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

Department of Computer Science and Artificial Intelligence Engineering

S.No	Subject	L-T-P	Credit
1	Operating systems	3-1-0	4
2	Data Structures Using C	3-1-0	4
3	DBMS	3-1-0	4
4	Data Engineering	3-1-0	4
5	Artificial Intelligence	3-1-0	4
6	Machine Learning	3-1-0	4

Annexure-3(b)

(MODEL FOR MINOR) SPECIALIZED TRACKS

Note

1. A student can opt Four subjects from each track @ 4 credits per subject
2. Concerned BoS can add or delete the subjects as per the decision of the board.
3. Pre requisites to be defined by the board for each course.
4. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

DEPARTMENT OF COMPUTER SCIENCE & ARTIFICIAL INTELLIGENCE ENGINEERING

(MODEL FOR MINOR) OTHER THAN PARENT DEPARTMENT

S.NO.	COURSE NAME	L-T-P	CR	PRE-REQ.	OFFERED TO
	TRACK-1				**NETWORKING & SECURITY**
1	TCP/IP Protocol Suite				
2	Network Architecture and Design				
3	Network Security				
4	Cryptography				
5	Computer Forensics				
	TRACK-2				**SOFTWARE ENGINEERING**
1	Software Metrics and Measurements				
2	Software Verification and Validation				
3	Software Architecture and Design Patterns				
4	Software Project Management				
5	Fault Tolerant Computing				
	TRACK-3				**DISTRIBUTED & CLOUD COMPUTING**
1	Enterprise Storage Systems				
2	Parallel Algorithms				
3	Cloud Networking				
4	Cloud Computing				
5	High Performance Computing				
	TRACK-4				**ARTIFICIAL INTELLIGENCE**
1	Artificial Intelligence				
2	Machine Learning				
3	Soft Computing				
4	Deep Learning				
5	Internet of Things				

ANNEXURE 4

COMMUNITY SERVICE PROJECT

……Experiential learning through community engagementAs per the decision of the decision of the concerned department BOS

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.

- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc
- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The log book has to be countersigned by the concerned mentor/faculty incharge.
- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
    - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.
    - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
        - Agriculture
        - Health
        - Marketing and Cooperation
        - Animal Husbandry
        - Horticulture
        - Fisheries
        - Sericulture
        - Revenue and Survey
        - Natural Disaster Management
        - Irrigation
        - Law & Order
        - Excise and Prohibition
        - Mines and Geology
        - Energy
        - Internet
        - Free Electricity
        - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey

31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilization of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Womens' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programmes for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programmes

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like –
    i. Agriculture
    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture
    viii. Revenue and Survey
    ix. Natural Disaster Management
    x. Irrigation
    xi. Law & Order
    xii. Excise and Prohibition
    xiii. Mines and Geology
    xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
- An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. **Preliminary Survey (One Week)**
   - A preliminary survey including the socio-economic conditions of the allotted habitation tobe conducted.
   - A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
   - The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. **Community Awareness Campaigns (Two Weeks)**
   - Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. **Community Immersion Programme (Four Weeks)**

   Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. **Community Exit Report (One Week)**
   - During the last week of the Community Service Project, a detailed report of the outcomeof the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor andsuitable marks are awarded for onward submission to the University.

     Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

I YEAR I Semester — COURSE STRUCTURE

S.NO	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of Examination			Category code
			L	T	P	INT	EXT	CREDITS	
1	CSM111	Mathematics-I	3	0	0	30	70	3	BSC
2	CSM112	Engineering Physics	3	0	0	30	70	3	BSC
3	CSM113	Engineering Graphics	1	0	4	30	70	3	ESC
4	CSM114	Problem Solving using C	3	0	0	30	70	3	ESC
5	CSM115	Basic Electrical Engineering	3	0	0	30	70	3	ESC
6	CSM151	Engineering Physics Lab	0	0	3	30	70	1.5	BSC
7	CSM152	Problem Solving using C Lab	0	0	3	30	70	1.5	ESC
8	CSM153	Introduction to Computing Lab	0	0	3	30	70	1.5	ESC
Total			13	0	13	240	560	19.5	

I YEAR II Semester — COURSE STRUCTURE

S.NO	CODE.NO	SUBJECT	Scheme of Instruction Periods per week			Scheme of Examination			Category code
			L	T	P	INT	EXT	CREDITS	
1	CSM121	Mathematics-II	3	0	0	30	70	3	BSC
2	CSM122	Engineering Chemistry	3	0	0	30	70	3	BSC
3	CSM123	Professional Communication	3	0	0	30	70	3	HSC
4	CSM124	Python programming	3	0	0	30	70	3	ESC
5	CSM125	Digital Logic Design	3	0	0	30	70	3	ESC
6	CSM161	Engineering Chemistry Lab	0	0	3	30	70	1.5	BSC
7	CSM162	Professional Communication Skills Lab	0	0	3	30	70	1.5	HSC
8	CSM163	Python programming Lab	0	0	3	30	70	1.5	ESC
9	CSM126	Design Thinking	2	0	0	30	70	0	MC
Total			17	0	9	270	630	19.5	

II YEAR I Semester — COURSE STRUCTURE

S. No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of Examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM211	Probability & Statistics	3	0	0	30	70	3	BSC
2	CSM212	Data Structures	3	0	0	30	70	3	PCC
3	CSM213	Micro Processors & Micro Controllers	3	0	0	30	70	3	ESC
4	CSM214	Principles of Programming Languages	3	0	0	30	70	3	PCC
5	CSM215	Operating Systems	3	0	0	30	70	3	PCC
6	CSM251	Operating Systems Lab	0	0	3	30	70	1.5	PCC
7	CSM252	Data Structures Lab	0	0	3	30	70	1.5	PCC
8	CSM253	Micro Processors & Microcontrollers Lab	0	0	3	30	70	1.5	ESC
		Skill Oriented Course*	1	0	2			2	SC
9	CSM216	Environmental Science	2	0	0	30	70	0	MC
Total			18	0	11	270	630	21.5	

II YEAR II Semester — COURSE STRUCTURE

S. No.	CODE.NO	SUBJECT	Scheme of Instruction Periods per week			Scheme of Examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM221	Mathematics-IV	3	0	0	30	70	3	BSC
2	CSM222	Database Management Systems	3	0	0	30	70	3	PCC
3	CSM223	Java Programming	3	0	0	30	70	3	PCC
4	CSM224	Design & Analysis of Algorithms	3	0	0	30	70	3	PCC
5	CSM225	Professional Ethics and Human Values	3	0	0	30	70	3	HSC
6	CSM261	Database Management systems Lab	0	0	3	30	70	1.5	PCC
7	CSM262	Java Programming Lab	0	0	3	30	70	1.5	PCC
8	CSM263	Algorithms Lab	0	0	3	30	70	1.5	PCC
		Skill Oriented Course*	1	0	2			2	SC
Total			18	0	11	240	560	21.5	

III YEAR I Semester **COURSE STRUCTURE**

S. No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM 311	ARTIFICIAL INTELLIGENCE	3	0	0	30	70	3	PCC
2	CSM 312	Software Engineering	3	0	0	30	70	3	PCC
3	CSM 313	Formal Language andAutomata Theory	3	0	0	30	70	3	PCC
4	CSM 314	Professional Elective-1 [MOOCS] a)Computer Graphics b)Web Essential & Services c)Computer Architecture d)Cloud Computing	3	0	0	30	70	3	PEC
5	CSM 315	Open Elective-1 (Renuable Energy Sources)-EEE	3	0	0	30	70	3	OEC
6	CSM 351	Artificial Intelligence Lab	0	0	3	30	70	1.5	PCC
7	CSM 352	Software Engineering lab	0	0	3	30	70	1.5	PCC
8	CSM 353	Summer Internship	0	0	0	30	70	1.5	PROJ
		Honors/Minor courses	4	0	0			4	
	CSM354	Skill Advanced Course	1	0	2			2	SC
9	CSM 316	Constitution of India	2	0	0	30	70	0	MC
Total			18	0	8	270	630	21.5	

III YEAR II Semester COURSE STRUCTURE

S. No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM 321	Computer Networks	3	0	0	30	70	3	PCC
2	CSM 322	Data Mining and Data Warehousing	3	0	0	30	70	3	PCC
3	CSM 323	Open Elective-II(MOOCS) [Air Pollution Control]	3	0	0	30	70	3	OEC
4	CSM 324	Professional Elective-II 1. Compiler Design 2. Soft Computing 3. Bio-informatics 4. Distributed Systems	3	0	0	30	70	3	PEC
5	CSM 325	MachineLearning	3	0	0	30	70	3	PCC
6	CSM 361	Computer Networks Lab	0	0	3	30	70	1.5	PCC
7	CSM 362	Data Mining Using Python Lab	0	0	3	30	70	1.5	PCC
8	CSM 363	Machine Learning Lab	0	0	3	30	70	1.5	PCC
		Honors/Minor courses	4	0	0			4	
	CSM 364	Skill Advanced Course	1	0	2			2	SC
Total			16	0	8	240	560	21.5	

IV YEAR I Semester **COURSE STRUCTURE**

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM 411	Professional Elective-III 1. Deep Learning 2. Natural Language Processing 3. Block Chain Technologies 4. SPM/STM	3	0	-	30	70	3	PEC
2	CSM 412	Professional Elective-IV 1.AI for Medical analysis 2.Interner Of Robotic Things 3.Cyber Security 4.Software architecture and Pattern Recognition	3	0	-	30	70	3	PEC
3	CSM 413	OPEN ELECTIVE-III (Internet of Things)	3	0	-	30	70	3	OEC
4	CSM 414	OPEN ELECTIVE-IV (Solid Waste Management)	3	0	-	30	70	3	OEC
5	CSM 415	Professional Elective-V 1. Cryptography and Network Security 2. Statistical Methods and Data Visualization 3. Data Analytics through R 4. Big Data Analytics	3	0	-	30	70	3	PEC
6	CSM 416	Humanities And Social Elective	3	-	-	30	70	3	HSC
7	CSM 417	Summer Internship	0	0	0	30	70	3	PROJ
		Honors/Minor courses	4	0	0			4	
		SKILL Advanced Courses*	2			30	70	2	SC
Total			20	0		240	560	23	

IV YEAR II Semester **COURSE STRUCTURE**

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CSM 421	Seminar	0	0	0	50		02	
2	CSM 422	MAJOR PROJECT (Project WORK, Seminar And Internship In Industry)	0	0	0			10	PROJ
Total			0	0	0			12	

Honor Courses:

1. Distributed Databases.
2. Distributed Operating systems/Advanced operating Systems
3. Intelligent Robots and Drone technologies
4. Advanced Parallel processing
5. Machine Translation
6. Bio inspired AI

CSM 111 **MATHEMATICS-I** **L T P C**
3 0 0 3

Course Objectives:

- To introduce theory of matrices and solving system of linear equations
- To explain the role of Eigen values and Eigen vectors for orthogonal transformations.
- To impart knowledge of mean value theorems and series expansions.
- To explain the importance of partial differentiation and improper integrals.
- To describe the role of multiple integrals in calculating areas and volumes.

UNIT-I

Matrices:

Matrices: Types of Matrices, Rank – Echelon form – Normal form -Inverse of a matrix by Gauss-Jordan method - Solution of Homogeneous linear systems – Solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

UNIT-II

Eigen values – Eigen vectors:

Eigen values – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse, Power of Matrix by Cayley Hamilton theorem — Reduction of quadratic form to Canonical form(Orthogonal transformation)–Rank, Index and Signature of a Quadratic form.

UNIT-III

Sequences-Series & Mean Value Theorems:

Sequences and Series: Convergence and divergence-Oscillatory sequences and series – Ratio test – Comparison test-D-Alembert's ratio test – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.

Rolle's theorem - Lagrange's mean value theorem - Geometrical interpretation - Cauchy's mean value theorem - Geometrical interpretation - Taylor's theorem - Maclaurin's series.

UNIT-IV

Special Functions & Calculus:

Definitions of improper integrals: Beta & Gamma functions and their applications

Partial Differentiation – Homogeneous function – Euler's theorem – Total derivative – Chain rule –Taylor's and Maclaurin's series – Expansion of two variable functions – functional dependence – Jacobean – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT-V

Multivariable Calculus:

Double Integrals:

Double integrals, change of order of integration, double integration in polar coordinates, area enclosed by plane curves.

Triple Integrals:

Evaluation of triple integrals, change of variables between Cartesian and cylindrical coordinates.

Text books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers.

CSM 112 **ENGINEERING PHYSICS** **L T P C**
3 0 0 3

Course Objectives:

- Introduce the fundamental concepts of wave optics, conducting materials and optoelectronic devices
- Familiarize the students with topics of Electromagnetic waves and Fiber optics
- Understand the concepts of Quantum mechanics and Semiconductors.
- Gain knowledge about the concepts of Lasers and learning advanced concepts like Superconductivity.

UNIT- I

Wave Optics

Principle of Superposition–Interference of light–Young's double slit Experiment–Interference in thin films by reflected light-Newton's Rings–Determination of Wavelength-Michelson Interferometer –Engineering applications

Diffraction–Fresnel Diffraction–Fraunhofer Diffraction –Single slit Diffraction–Diffraction Grating–Grating Spectrum –Determination of Wavelength–engineering applications

UNIT- II

Laser and Fiber Optics

Characteristics of Laser–Spontaneous and Stimulated emissions–Principle of lasing action–Population inversion– Pumping–Einstein's Coefficients–Components of laser system–Working principle of Ruby laser, He-Ne laser–Applications of lasers.

Introduction to Optical Fibers–Principle of optical fiber–Critical angle, Acceptance angle–Numerical Aperture–Classification of fibers based on Refractive index profile, Modes–Fiber optic Communication system–Applications of Optical fiber.

UNIT-III

Quantum Mechanics

Introduction–Matter waves–de-Broglie's Hypothesis of matter waves–Properties of matter waves– Heisenberg's uncertainty principle–Schrodinger's time independent and time dependent wave equation –Physical significance of the wave function–Particle in one dimensional potential box.

UNIT- IV

Semiconductors

Origin of energy band formation in solids–Classification of materials into conductors, semi-conductors & insulators – Semiconductors–Intrinsic semiconductors–dependence of Fermi level on carrier concentration and temperature(Qualitative)–Electrical conductivity–Extrinsic semiconductors–P-type & N-type, Dependence of Fermi level on carrier concentration and temperature (Qualitative)–Drift & Diffusion Currents–Einstein's equation–Hall effect–Direct and Indirect band gap semiconductors– LED, Photo conductor and Solar cell–Applications of Semiconductors.

UNIT- V

Electromagnetic Theory and Superconductivity

Gauss theorem, Strokes theorem– Fundamental laws of electromagnetism–Equation of continuity–Displacement Current– Maxwell's electromagnetic wave equations–Propagation of electromagnetic waves in dielectric and conducting media.

Introduction to superconductivity–Properties-critical parameters (T_c, H_c, I_c)–Meissner effect–Types of superconductors–London Equations–BCS Theory (Qualitative)–Josephson effect–High T_C Superconductors–Applications of superconductors.

Text Books:

1. A Text book of Engineering Physics - M.N. Avadhanulu and P.G. Kshirsagar - S.Chand Publications,2017
2. A Text book of Engineering Physics - Dr. D. Thirupathi Naidu and M Veeranjaneyulu -V.G.S. Book Links,2019

Reference Books:

1. Engineering Physics - R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications (P) LTD, 2008
2. Optical Fiber Communications- 4/e, Gerd Keiser, Tata Mc GrawHill, 2008
3. Introduction to Solid State Physics- Charles Kittel, Wiley Publications, 2011
4. Semiconductor devices-Physics and Technology- S.M. Sze,Wiley, 2008

CSM 113 **ENGINEERING GRAPHICS** **L T P C**
1 0 4 3

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.

UNIT- I

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions. Dimensioning principles and conventional representations. a) Conic sections including the rectangular hyperbola-general method only, b) Cycloid, epicycloids and hypo cycloidc) Involutes.

UNIT- II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

UNIT- III

Projections of solids: Projections of regular solids inclined to one or both planes by rotational.

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

UNIT- IV

Orthographic Projections: Systems of projections, orthographic projections (Simple Figures).

UNIT- V

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

Text Books:

1. K.L.Narayana& P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016
3. Engineering Graphics & Design, Jain, Maheshwary, Gautam, Khanna Publishing House
4. Engineering Drawing, ND Bhat, Charotar Publishing House

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, 2008.

CSM 114 **PROBLEM SOLVING USING C** **L T P C**
3 0 0 3

Course Objectives:

- Students will able to implement the algorithms & draw flowcharts for solving problems.
- Student will able to understand computer programming language concepts and code with branching & iterations.
- Design modular programming & recursive solution formulation using the concept of functions and arrays.
- Ability to design well-structured programs with the concept of structures and pointers.

UNIT- I

Flowchart design through Raptor: Flow chart symbols, Input/ Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers.

UNIT- II

C Basics: C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associatively, Simple programs in C using all the operators, Type casting, type coercion.

UNIT- III

Control Structures and Functions: Control Structures, Basic input and output statements, Preprocessor directives. Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

UNIT- IV

Arrays and Pointers: Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation. Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

UNIT- V

Structures and Files: Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures. Command line arguments. Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

Text Books:

1. Programming in ANSI in C, E Balaguruswamy, Tata McGraw Hill
2. C Programming – AnithaGoel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India
3. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing

Reference Books:

1. https://raptor.martincarlisle.com/
2. Problem Solving with C- Somasekharan-PHI.
3. C Programming- Behrouz A forouzan – CENGAGE Learning
4. Let us C, Yashavant P. Kanetkar, BBP Publications, Delhi

CSM 115 BASIC ELECTRICAL ENGINEERING L T P C

3 0 0 3

Course Objectives:

- To learn the basics of the D.C. circuit analysis.
- To have an idea about single-phase and three-phase A.C. electrical circuits.
- To gain knowledge about basic magnetic circuits and transformers.
- To learn the construction and operation of D.C. and A.C. machines.

UNIT - I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT- II

AC 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. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT- III

DC Machines & Transformers: Construction and working of DC machine - EMF equation DC Generator- OCC characteristics of DC generator, Classifications of DC motor and their applications

Transformer - Ideal and practical transformers, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer.

UNIT- IV

AC Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction and working of synchronous generators.

UNIT- V

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

Text Books:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6thEdition, TMH, 2002.
2. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4th Edition, TMH, 2010
3. Electric Machines by I.J. Nagrath& D.P. Kothari, Tata Mc Graw – Hill Publishers

Reference Books:

1. Fundamentals of Electric Circuits / Charles K. Alexander, Matthew N. O. Sadiku. — 5th ed.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.
3. Electric Machinary-A.E. Fritzgerald, C. Kingsley &S. Umans, Mc Graw-Hill Companies, 6thediton 2003.

CSM 151 **ENGINEERING PHYSICS LAB** **L T P C**

0 0 3 1.5

LIST OF EXPERIMENTS

1. Determination of radius of curvature of plano convex lens by Newton's rings method
2. Determination of wavelength by using plane diffraction grating.
3. Determination of dispersive power of a Prism
4. Determination of wavelength of given Laser source
5. Determination of numerical aperture of a given optical fiber and hence to find its acceptance angle
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Hall effect –Determination of Hall Coefficient
8. Photo voltaic cell - Determination of fill-factor
9. Determination of energy gap of a semiconductor
10. Measurement of resistance with varying temperature
11. Carey- Foster's bridge: Determination of specific resistance/Temperature coefficient of resistance.
12. Magnetic field along the axis of a circular coil carrying current.
13. Series LCR resonance circuit - Determination of "Q" factor
14. Determination of frequency of A.C supply using Sonometer
15. Determination of acceleration due to gravity by using compound Pendulum

CSM 152 **PROBLEM SOLVING USING C LAB** **L T P** C

0 0 3 1.5

LIST OF EXPERIMENTS

Program- 1:

1. Construct flowcharts to

a. calculate the maximum, minimum and average of N numbers

b. Develop a calculator to convert time, distance, area, volume and temperature from one unitto another.

c. calculate simple and compound interest for various parameters specified by the user

d. generate first N numbers in the Fibonacci series

Program- 2:

Write a program

a) Which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double.

b) To find greatest of three numbers using conditional operator.

c) To swap two numbers with and without temporary variable.

d) Multiple unary increment and decrement operators in arithmetic expressions.

Program- 3:

Write a program

a) To find greatest of three numbers.

b) To find arithmetic operations using switch.

c) To count the digits of a number.

d) To check whether a number is perfect or not.

Program- 4:

Write a program

a) To check whether a number is strong or not.

b) To check whether a number is armstrong or not.

c) To check whether a number is palindrome or not.

d) To find the Fibonacci series upto the given number.

Program- 5:

Write a program

a) To swap two variables using functions.

b) To perform menu driven arithmetic operations using functions.

c) To find the factorial of a number using recursive and non- recursive functions.

d) To find the Fibonacci series using recursive functions.

e) To find the solution for towers of Hanoi using recursive function.

f) Pass parameters to a functions using call by value and call by reference.

Program- 6:

Write a program on Arrays

a) To read n numbers and sort them.

b) To find the minimum and maximum numbers.

c) To read two matrices and find their sum, difference and product of them.

Program- 7:

Write a program on strings

a) To demonstrate the use of string manipulation functions.

b) To sort the names in Alphabetical order.

Program- 8:

Write a program on pointers

a) To read dynamic array and sort the elements.

b) To perform pointer arithmetic.

Program- 9:

Write a program

a) To create student structure and read marks of three subjects and find the sum and total of the student.

b) for 60 students record using the above student structure.

c) To implement complex structure. Perform addition, subtraction and multiplication of two complex numbers.

Program- 10:

Write a program on Files

a) To append content of a file.

b) To display the content of a file.

c) To copy content of one file to other file.

d) To count the no of characters in a file.

e) To compare the contents of two files.

CSM 153 INTRODUCTION TO COMPUTING LAB L T P C
0 0 3 1.5

LIST OF EXPERIMENTS

Exercise No: 1

a. Identify various kinds Computing devices and their components.
b. Identify the different peripherals, ports and connecting cables in a PC.
c. Assemble and disassemble components of a PC

Exercise No: 2

Title : Document creation, Text manipulation with Scientific Notations
a. Starting Word
b. Creating Documents
c. Opening a Word document
d. Cutting, Copying and Pasting Text
e. Modifying Font
f. Aligning Text
g. Indenting Paragraphs and modifying line spacing
h. Setting and Modifying Tabs
i. Inserting Numbers and bullets in the word document
j. Inserting Bullets

Exercise No: 3

Title : Table creation, Table formatting and Conversion
a. Open a new document and insert a table with the following data: First Name Last Name Phone Address
b. Save the document with address.doc
c. Select the first Row and Bold the Text.
d. Align the text in the first row to "Center" and align the text in the remaining rows to "Left".
e. Insert a New Column to the beginning of the table with the data given.
f. Add a New Row to the End of the Table.
g. Insert a New Row between 3 and 4
h. Insert a New Column between 4th and 5th Column.
i. Change the size of the second column's width.
j. Sort the data according to alphabetical order of "First Name".
k. Delete the third row and third Column from the table.
l. Create a new row at the top of your table, merge the cells, and add a title to the table.
m. Split the above table into two tables
n. Apply Borders, Shading and Color to the table.
o. Spell check your document and correct all the grammatical as well as spelling mistakes
p. Save the above document as table.doc.

Exercise No: 4

Title: CHARTS – Line, XY, Bar and Pie

	A	B	C	D	E	F	G	H
1	Mark Analysis – I year							
2	**Roll No.**	**Name**	**Mark I**	Mark II	Mark III	Total	Average	
3	1	Meena	67	98	56			
4	2	Vishal	56	67	65			
5	3	Elisa	98	97	90			
6	4	Richa	78	87	89			
7	5	Swetha	45	56	54			
8	6	Dravid	78	56	87			
9	7	Sourav	34	45	53			

SPREAD SHEETTo analyze the marks
of I year students
a. Enter the above data in a worksheet and save the workbook as student.xls ii) Calculate

total and average for each student.
b. Save the workbook again.
c. Draw a pie chart to denote the names Vs total marks.
d. Try out various charts.

Exercise No: 5
Title :Power Point Presentation
Prepare a power point presentation on the topic given with minimum 10 slides and present it.

Exercise No: 6
Title :Mail Merge
Open a new document and type the following letter.
Enclosure: Resume.
a. Save the document as “Letter.doc.”
b. Send the document to 10 recipients using Mail merge. (Use 10 different addresses)
c. Close the document.

Exercise No: 7
Title :Website Design
Design a sample website with minimum 6 pages.

Exercise No: 8
Title :Git Hub
Open an account in GitHub and upload the designed website to GitHub.

Exercise No: 9
Title :Cloud Services
Design Cloud Service with Web Role to demonstrate Windows Azure Blob Storage.

Exercise No: 10
Title :Cloud Services
Design Cloud Service with WebRole to demonstrate Windows Azure Table Storage.

First Year Second Semester

CSM 121	MATHEMATICS-II	L	T	P	C
		3	0	0	3

Course Objectives:

- To introduce important features of differential equations and related methods
- To familiarize the techniques of solving partial differential equations arising in engineering
- To introduce the subject of vector calculus to the students.
- To make the students aware of the importance between mathematics and engineering.

UNIT-I

Linear Differential Equations of first:

Introduction-Exact – Reducible to exact differential equations, Linear and Bernoulli's equations –Applications: Orthogonal trajectories – Newton's law of cooling – Law of exponential growth and decay.

UNIT- II

Linear Differential Equations of Higher Order:

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type: e^{ax}, sin ax, cos ax, x^k, e^{ax} V(x) and x^m V(x).

Applications: Method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy- Euler equation.

UNIT- III

Partial Differential Equations and Applications:

Introduction, Formation of PDE, Solution of PDE, Linear equations of first order, Non-linear equations of first order.

Applications: Method of separation of Variables, One dimensional Wave, Heat equations and Laplacian equation.

UNIT- IV

Vector Calculus: Vector differentiation:

Scalar and vector point functions, Del applied to scalar point functions. Gradient – Divergence – Curl – Vector identities.

UNIT- V

Vector Integration:

Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

CSM 122 **ENGINEERING CHEMISTRY** **L T P C**
3 0 0 3

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
- compare the materials of construction for battery and electrochemical sensors (L2)
- explain the preparation, properties, and applications of thermoplastics & thermo settings, elastomers & conducting polymers. (L2)
- explain the principles of spectroscopy, GC and HPLC in separation of gaseous and liquid mixtures (L2)

UNIT- I

Water Technology: Various impurities of Water, WHO guidelines, Hardness unit sand determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

UNIT- II

Polymer Chemistry

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

Plastics: Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

Conducting Polymers- Introduction, examples, general applications and mechanism of Conduction on Poly acetylene.

Chemistry of Nano materials: Introduction to nano chemistry, preparation of nano materials - carbon nano tubes and fullerenes and their engineering applications.

UNIT- III

Electro Chemistry and Applications

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

Batteries: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H_2-O_2 cell).

Corrosion: Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

Corrosion control: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

UNIT- IV

Instrumental Methods

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

UNIT- V

Cement and Concrete chemistry

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

Organic Reactions and Synthesis of a Drug Molecule:

Introduction to reactions involving Substitution (SN_1 and SN_2), Elimination reactions (E_1 and E_2), Synthesis of commonly used drug molecule – Aspirin and Paracetamol.

Text Books:

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Instrumental methods of analysis, 7th edition, Gurudeep raj & Chatwal Anand, CBS Publications,1986.
5. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

References Books:

1. Quantitative analysis - Day & Underwood.
2. A Text book of Instrumental methods - Skoog and West.
3. Instrumental methods of analysis, 7th edition, H.W. Wilard and Demerit, CBS publications, 1986.
4. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

CSM 123 COMMUNICATIVE ENGLISH

L	T	P	C
3	0	0	3

Course Objectives:

1. To inculcate a sense of professionalism among the students while emphasizing on vocabulary building.
2. To adopt activity-based teaching-learning methods to ensure that learners would be engaged in use of language.
3. To provide pertinent reading strategies for comprehension.
4. To impart effective strategies for sensible writing and demonstrate the same in briefing.

Unit – I

Text Title: A Proposal to Girdle the Earth (Excerpt) by Nellie Bly
Theme: Exploration
Speaking: Introducing oneself and others
Listening: Topic, Context, and specific pieces of information
Reading Skills:
Reading Comprehension, Introduction, skimming and Scanning for Central Idea
Writing Skills: Writing Paragraphs
Grammar and Vocabulary: Functional words and Parts of Speech and Wh-Questions
Parts of Speech, Subject – verb Agreement, Wh - Questions

Unit – II

Text Title: The District School as It was by One Who went to It, Warren Burton
Theme: On Campus
Speaking Skills: Preparing and delivering short, structured talks
Listening: Main idea and supporting Ideas
Reading Skills:
Reading Comprehension, Tips for Identifying the central Idea
Writing Skills: Punctuation, Paragraph Writing, Principles of Paragraph Writing – Sentence Linkers/Signposts/Transition Signals
Grammar and Vocabulary: Articles, Prepositions, Synonyms and Phrases in context
Tenses, Conditional Sentences, Sign Posts and Transition Signals.

Unit – III

Title: Working Together Theme: The Future of Work
Speaking: Discussing and Reporting what is discussed
Listening: Global Comprehension
Reading Skills:
Reading Comprehension
Writing Skills: Summarizing, Rephrasing what is read, avoiding redundancies and repetitions
Grammar and Vocabulary: Subject-Verb Agreement, Tenses, Direct and Indirect Speech

Unit – IV

Title: H.G. Wells and the uncertainties of Progress, Peter J. Bowler
Theme: Fabric of Change
Speaking Skills: Role Plays-Formal and Informal
Listening Skills: Making Predictions (listening with or without videos)
Reading Skills:
Studying the use of graphic elements in texts
Writing Skills:
Information transfer
Grammar and Vocabulary: Quantifying expression, Adjective and Adverbs and Degrees of Comparison

Unit – V

Title: Leaves from the mental Portfolio of a Eurasian, Sui Sin Far
Theme: Tools for Life
Listening: Identifying Key terms, Understanding concepts,
Speaking Skills: Formal oral presentations
Reading Skills: Comprehension exercises practice
Writing Skills: Structured Essays
Grammar and Vocabulary: Letter Writing: Formal and Informal
One-word substitutes and Idioms

Textbooks:

1. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019.

Reference Books:

1. Academic writing: A handbook for International Students Bailey, Stephen. . Routledge, 2014.
2. Pathways: Listening, Speaking and Critical Thinking Chase, Becky Tarver. . Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B10), Macmillan Educational.
4. Word Power Made Handy Dr. Shalini Verma,, S.Chand & Co Ltd., 2009.
5. Objective English for Compititive Examinations Hari mohan Prasad, Uma rani sinha, New Delhi, Tata McGraw-Hill P.Ltd, 2007.

AICTE Recommended Books

1. Communication Skills Sanjay Kumar and Pushp Lata, , Noida: Oxford University Press, 2012.

2. Communication Skills- Meenakshi Raman, Sangeetha Sharma, , Oxford University Press, 2011

CSM 124 **PYTHON PROGRAMMING** **L T P C**

3 0 0 3

Course Objectives:

- To understand programming skills on python
- To understand the concepts of functions
- To learn how to use data types in python
- To acquire object oriented skills in python

UNIT- I

Context of software development: Software, Development tools, Learning programming with Python, Writing a python program.

Values and Variables: Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

Expressions and Arithmetic: Expressions, Operator precedence and Associatively, Comments, Errors, More arithmetic operators.

UNIT-II

Conditional Execution: Boolean Expressions, Simple if and if else, nested conditionals, multi-way decision statements, conditional expressions, errors in conditional statements.

Iteration: While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops.

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT- III

Functions: Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number.

More on Functions: Global variables, Default Parameters, recursion, making functions reusable, documenting functions and modules, functions as data.

Modules: Creating modules, import statement, from. Import statement, name spacing,

Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT- IV

Lists processing: Sorting, flexible sorting, search.

Object Oriented Programming OOP in Python: Classes, 'self variable', Abstract classes and Interfaces, Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

UNIT- V

PYTHON:-OS and SYS, multithreading, date and time, Graphical user interfaces.

File Handling:-open(), read(), create(), and delete ()

Text books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Learning To Program With Python Richard L. Halterman
3. Core Python Programming by Dr. R.Nageswara Rao, dream tech, second edition

Reference Books:

1. Introduction to Computing and Problem Solving with Python, J. Jose, Khanna Publications
2. Python Programming, Seema Thareja, Pearson

CSM 125 **DIGITAL LOGIC DESIGN** **L T P C**

3 0 0 3

Course Objectives:

- To impart the essential knowledge on the fundamentals and applications of digital circuits and digital computing principles.
- To provide an overview on the design principles of digital computing systems.
- To provide technical knowledge about various digital hardware components.
- To identify basic requirements for a design application and propose cost effective solution.

UNIT- I

Number Systems and Boolean Algebra: Number Systems and their Conversions, ASCII code, Excess -3 codes, Gray code. Binary codes, Error detection and correction codes, fixed point and floating-point arithmetic, Boolean algebra, Simplification of Boolean functions using K maps and Tabulation method.

UNIT- II

Combinational Logic Circuits: Design and applications of binary adders and subtractors, Carry Look Ahead Adder, Comparators, Encoders, Decoders, Multiplexers and Demultiplexers, Design of BCD to 7 Segment Decoder, Parity Generator and Checker, BCD Adder/Subtractor.

UNIT- III

Sequential Logic Circuits: Latches and flip-flops, Excitation Tables, State tables and State Diagrams of flip-flops, Flip-flop conversions. Shift registers, Analysis and Synthesis of Sequential Circuits and Counters.

UNIT- IV

Finite State Machines: Basic Design Steps, Sate Assignment Problem, Mealy State Model, Serial Adder, State Minimization, Design of a Counter using the Sequential Circuit Approach.

UNIT- V

Algorithmic State Machine: Digital System Design Using ASM Charts, Introduction to Programmable Logic Devices.

Text Books:

1. M Morris Mano and Micael D. Ciletti, Digital Design, Pearson Education, 2008
2. Donald E Givone, “digital principles and design”, TMT.
3. R. P. Jain, "Modern Digital Electronics", 4th edition, McGraw Hill Education (India Private Limited), 2012.

Reference Books:

1. Thomas L. Floyd, Digital Fundamentals 7th Edition, Pearson
2. Charles H. Roth jr., Fundamentals of logic Design, Jaico publications, 1992
3. Z. Kohavi and N. K. Jha, “Switching and Finite Automata Theory”, 3rd Edition, Tata McGraw Hill, 2010.

CSM 126	ENVIRONMENTAL SCIENCE (Mandatory)	L	T	P	C
		2	0	0	0

OBJECTIVE:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations.
- To identify the causes for pollution due to the day to day activities of human life to save earth from the inventions by the engineers.
- To make the students aware of Solid Waste Management.
- To Familiarize the Environmental Acts.

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES:

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits of rubber dams and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources.

UNIT – II: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION

ECOSYSTEMS:

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION:

Definition: genetic, species and ecosystem diversity – Bio- geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, Man - wild life conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III: ENVIRONMENTAL POLLUTION AND SOLID

WASTE MANAGEMENT ENVIRONMENTAL POLLUTION:

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT:

Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: SOCIAL ISSUES AND THE ENVIRONMENT

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK:

Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds –

TEXT BOOKS

1. Text book of Environmental Studies for Undergraduate Courses - Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies - Palaniswamy – Pearson education
3. Environmental Studies - Dr.S.Azeem Unnisa, Academic Publishing Company
4. Environmental Studies – Benny Joseph,
5. Environmental Studies - Kaushik

REFERENCES

1. Textbook of Environmental Science - Deeksha Dave and E.Saibaba Reddy, Cengage Publications.
2. Text book of Environmental Science and Technology - M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies - J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – PHI
5. A Text Book of Environmental Studies - G.R.Chatwal, Himalaya Publishing House

CSM 161	ENGINEERING CHEMISTRY LAB	L	T	P	C
		0	0	3	1.5

LIST OF EXPERIMENTS

1. Determination of hardness of water by EDTA method
2. Estimation of Mohr's salt by Permanganometry
3. Estimation of Mohr's salt by Dichrometry
4. Determination of alkalinity of water
5. Percentage of purity of washing soda
6. Determination of available chlorine in bleaching powder
7. Preparation of Urea-Formaldehyde resin
8. Determination on strength of NaOH using HCl conductometry
9. Acid-Base titration by P^H meter
10. Acid-Base titration by Potentiometer
11. Determination of viscosity of lubricating oil
12. Determination of Surface tension

CSM 162 PROFESSIONAL COMMUNICATION SKILLS LAB **L T P C**

0 0 3 1.5

LIST OF MODULES

Module-1: **Phonetics**

a) Introduction to Phonetics
b) Vowels and Consonants
c) Accent, Intonation and Rhythm

Module-2: **Listening Comprehension**

a) Comprehending Spoken material in British English
b) Comprehending Spoken material in American English
c) Intelligent listening in situations

Module-3: **Every Day Situations: Conversation and Dialogues**

a) Introducing oneself & others
b) Asking for & giving permissions
c) Asking for and responding to give directions
d) Seeking request
e) Inviting and responding invitations

Module-4: **Interview Skills**

a) Introduction and Definition
b) Process of Interviews
c) Stress Interview
d) Technical Interview

Module-5: **Presentation Skills**

a) Extempore (JAM) Sessions
b) Group discussion
c) Identification of Source Material

Reference Books:

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Communicate to Conquer: A Handbook of Group Discussions and Job Interviews with CD, PHI Publications.
2. The ACE of Soft Skills: Attitude, communication and Etiquette for Success, -Pearson Publications.
3. Communication Skills2nd Edition- LeenaSen, - PHI, 2007.
4. Organizational Behavior13th Edition-Stephen P. Robbins and Timothy A. Judge, PHI, 2009.
5. Business Communication- Meenakshi Raman and Prakash Singh, Oxford Univ. Press, 2006.
6. Communication Skills,Sanjay Kumar and PushpLata,Oxford University Press, 2011.
7. Word Power Made Handy-Dr. ShaliniVerma, S.Chand& Co Ltd., 2009.
8. Phonetics-O'Connor, J.D., Penguin, Harmondsworth, 1984

CSM 163	PYTHON PROGRAMMING LAB (Common to all the Branches)	L T P C 0 0 3 1.5

LIST OF EXPERIMENTS

1. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.
4. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
5. Design a Python Script to convert a given number to words
6. Design a Python Script to convert a given number to roman number.
7. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average, Sum etc) on public datasets.
8. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.
9. Design a Python script to search an element in the given list.
10. Design a Python script on str methods and list methods.

SECOND YEAR FIRST SEMESTER

CSM 211 Mathematics-III: Probability and Statistics **L T P C**
3 0 0 3

Course Objectives:

- To teach the learners the foundations of probability theory.
- To impart the concepts of statistical methods to solve engineering applications
- To apprise the students with the concept of Testing of hypothesis.
- To provide the learners solving application problems of their disciplines.
- To make the students aware of the importance between statistical techniques and engineering.

UNIT- I

Probability

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT- II

Distributions

Probability distribution - Binomial, Poisson approximation to the binomialdistribution and normal distribution-their properties.

UNIT- III

Descriptive statistics and methods for data science

Measures of Central tendency: Arithmetic Mean – Median – Mode - Geometric Mean- Harmonic Mean Measures of Dispersion: Range – Quartile Deviation – Variance, Standard Deviation –Skewness- Kurtosis. Curve Fitting and Principles of Least Squares. Correlation- correlation coefficient - rank correlation - Regression coefficients -Regression lines.

UNIT- IV

Estimation and Testing of hypothesis: Large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test.

Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

UNIT-V

Testing of hypothesis: Small sample tests

Small Sample Tests: Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

TEXT BOOKS:

1. Miller and Freund, Probability and Statistics for Engineers, 7th Edition, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons Publications, 2012.
3. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2017.

REFERENCES:

1. S. Ross, a First Course in Probability,8th Edition, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1st Edition, Wiley, 1968.

CSM 212 **DATA STRUCTURES** **L T P C**

3 0 0 3

Course Objectives:

- To understand the importance of algorithm
- To design and implement arrays, stacks, queues, and linked lists
- To understand the complex data structures such as trees and graphs
- To understand the various techniques of sorting and searching

UNIT- I

Development of Algorithms -Notations and analysis -Storage structures for arrays -Sparse matrices -Stacks and Queues: Representations and applications.

UNIT- II

Linked Lists -Linked stacks and queues -Operations on polynomials -Doubly linked lists -Circularly linked lists -Dynamic storage management -Garbage collection and compaction.

UNIT- III

Trees: Binary Trees -Binary search trees -Tree traversal -Expression manipulation -Symbol table construction-Height balanced trees (AVL trees) -Red-black trees.

UNIT- IV

Graphs -Representation of graphs -Traversal Methods (BFS, DFS)- Applications of DFS-Connected and Bi-Connected Components -Topological sort.

UNIT- V

Searching Methods - Linear search -Binary search –Hash table Methods.
Sorting Techniques - Selection, Shell, Bubble, Insertion, Merge, Quick, Heap and Radix sort.

Text Books:

1.J. P. Tremblay and P. G. Sorenson, "An Introduction to Data Structures with applications", Second Edition, Tata McGraw Hill, 1981
2.M. Tanenbaum and Augestien, “Data Structures using C”, Third Edition, Pearson Education 2007.
3. Fundamentals of Data Structures, Sartaj Sahni, University Press
4. Data Structures, RS Salaria, Khanna Publishing House

Reference Books:

1. Data Structures through C, Yashwant Kanetkar, BPB Publications
2. Expert Data Structures with C++, RB Patel, Khanna Publications

CSM 213 MICROPROCESSORS AND MICROCONTROLLERS L T P C
3 0 0 3

Course Objectives:

- Assess and solve math operation using micro processor
- Apply knowledge and demonstrate programming proficiency
- Analyze assembly language preprogram and select appropriate assembler utility.
- Design interface gravity to the micro processor in order to interface processor to external devices.

UNIT- I

8086/8088 Processor: Features, Pin Diagram and Description, Architecture, Addressing Modes, Instruction Set and Assembly language Programming.

UNIT- II

Programming Peripheral Interface and I/O Devices: Interfacing Programming peripheral interface PPI 8255, interfacing memory and I/O Devices. LED and Switch interfacing to 8086 using 8255. Universal Synchronous Asynchronous Receiver Transmitter – Interfacing of 8251

UNIT- III

Direct Memory Access and Interrupt system: DMA, Need of DMA, Memory management, Interfacing 8257, DMA controller, Interrupts, Programmable interrupt controller PIC-8259.

UNIT- IV

Introduction to micro-controllers: Overview of 8051 micro-controller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051, Simple programs.

UNIT- V

8051 Real Time Control: Programming Timer interrupts, programming external hardware interrupts, Programming the serial communication interrupts, Programming 8051 timers and counters.

Text Books:

1. Microprocessor and interfacing by Douglas V.Hall, McGraw Hill International Edition, 1992.
2. 2.Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning,2010

Reference Books:

1. The Intel microprocessor 8086/8088, 80186, 80286, 80386, and 80486 by Barry B. Brey PHI, 1998.
2. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition 2006.
3. 8086/8088 Microprocessors by Walter A. Tribel and Avtar Singh, PHI, 1991.

CSM 214 PRINCIPLES OF PROGRAMMING LANGUAGES **L T P C**
3 0 0 3

Course Objectives:

- To understand the evolution of programming languages.
- To introduce the notations to describe the syntax and semantics of programming languages.
- To introduce the principles and techniques involved in design and implementation of modern programming languages.
- To introduce the concepts of concurrency control and exception handling.

UNIT- I

Preliminary concepts: Reasons for studying, concepts of programming languages, Language Evaluation Criteria, influences on Language design, Language categories. Programming Language Implementation – Compilation, Hybrid Implementation, Pure Interpretation and Virtual Machines. methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute.

Syntax and semantics: General Problem of describing Syntax and Semantics, formal grammars.

UNIT- II

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

Expressions and statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements.

UNIT- III

Subprograms and blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

Abstract data types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95.

UNIT- IV

Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.

Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

UNIT- V

Functional programming languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Logic programming language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Text Books:

1. Robert .W. Sebesta, Concepts of Programming Languages, 6th Edition, Pearson Education, 2002. (1 to 5 units)
2. Lowlen, Programming Languages, 3rd Edition, 2012.

Reference Books:

1. Ghezzi, “Programming languages”, 3rd Edition, John Wiley, 2008.
2. Pratt and Zelkowitz, “Programming Languages Design and Implementation”, 4th Edition PHI/Pearson Education, 2008.
3. Watt, “Programming languages”,1st Edition, Wiley Dreamtech, 2004.
4. Patric Henry Winston and Paul Horn, LISP, 3rd Edition, Wiley Dreamtech, 2005.
5. Clocksin, “Programming in PROLOG”, 5th Edition, Springer, 2004.

CSM 215 **OPERATING SYSTEMS** **L T P C**

3 0 0 3

Course Objectives:

- To know the basics such as process and CPU scheduling algorithms.
- To understand the critical regions and dead lock problem.
- To understand virtual memory concept, thrashing problem and page replacement algorithms.
- To understand the file tables, access algorithms, and spoofing.

UNIT- I

Introduction to Operating Systems- What operating systems do, Operating System operations, Process management, Memory management, Storage management, Protection and security. **System Structures**- Operating System Services, System calls, Operating System design and implementation, Operating System structure, Virtual machines.

UNIT- II

Process Management - Process concept, Process scheduling, Operations on processes, Inter- process communication. **Process Scheduling**- Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling. **Process Synchronization**- Background, The Critical section problem, Synchronization hardware, Semaphores, Classical problems of synchronization.

UNIT- III

Deadlocks- System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock. **Memory Management Strategies**- Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation. **Virtual Memory Management**- Background, Demand paging, Page replacement, Thrashing.

UNIT- IV

File System- File concept, Access methods, Directory structure, Protection. **Implementing File System-** File system structure, File system implementation, Directory implementation, Allocation methods, Free space management. **Secondary Storage Structures**-Mass storage structures, Disk structure, Disk scheduling

UNIT- V

Dockers-Docker Basics and Architecture, What is containerization, how are containers different from physical machines and VMs, Docker evolution and architecture, Developments in Docker world, Docker tooling, Basic Docker commands. **Docker Networking**- Introduction, Types of Docker networks, Using Networks, Identifying container networks, **Docker Volumes**-Managing data in Docker containers with volumes, Volume file systems And basic Docker image file systems, Creating and managing volumes.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 9th edition, Wiley-India, 2012.

Reference Books:

1. William Stallings: Operating systems Internals and Design Principles | Ninth Edition, Pearson Education, 2018

2. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci- Dusseau, Operating systems: Three easy pieces, URL : http://pages.cs.wisc.edu/~remzi/OSTEP/

3. James Turnbull: The Docker Book: Containerization is the new virtualization Kindle Edition, Kindle Edition,2014.

CSM 216 DESIGN THINKING AND PRODUCT INNOVATION L T P C
2 0 0 0

Course Objectives:

- To bring awareness on innovative design and new product development.
- To explain the basics of design thinking.
- To familiarize the role of reverse engineering in product development.
- To train how to identify the needs of society and convert into demand.
- To introduce product planning and product development process.

UNIT-I

Science to Engineering: Job of engineers, engineering units and measurement, elements of engineering analysis, forces and motion, energy, kinematics and motion, conversion of linear motion to rotary and vice versa, motion transmission. Physics to Engineering: Application of Newton laws, Pascal's law, Bouncy, Bernoulli's theorem, Ohm's law, electrical induction in engineering products.

UNIT-II

Historical Development: Invention wheel, early mechanics in design, mechanical advantages, industrial revolution, steam and petrol for mobility. Innovations in Electrical and Electronics: Electrical energy generation, electrical bulb, electrical equipment, electronics and automation, computing for early days to present, innovations in communications.

UNIT-III

Systematic approach to product development: Design Thinking, Innovation, Empathize Design Thinking as a systematic approach to Innovation, brainstorming, visual thinking, design challenges, innovation, art of Innovation, strategies for idea generation, creativity, teams for innovation. Solution finding methods: Conventional, intuitive, discursive, methods for combining solution, decision making for new design.

UNIT-IV

Reverse engineering in product development: Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, 3D printing, study of introducing electrical and electronic controls to the old products, importance of ergonomics in product development, environmental considerations in design, safety considerations in design.

UNIT-V

Study of Product Development- Agriculture, development of machines for separation of corn seeds, peeling of groundnut shells, husk removing from paddy. Electrical: Design of burglar alarm, speedometer, water level indicator, smart gates, smart lights. Design of electrical vehicles, unmanned vehicles, design principles in drones.

Text Books:

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, "Exploring Engineering: An Introduction to Engineering and Design", 4th edition, Elsevier, 2016.
2. David Ralzman, "History of Modern Design", 2nd edition, Laurence King Publishing Ltd., 2010
3. An AVA Book, "Design Thinking", AVA Publishing, 2010.

Reference Books:

1. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, "Engineering Design: A Systematic Approach", 3rd edition, Springer, 2007.
2. Tom Kelley, Jonathan Littman, "Ten Faces in Innovation", Currency Books, 2006.

CSM 251 **OPERATING SYSTEMS LAB** **L T P** C

0 0 3 1.5

LIST OF EXPERIMENTS

1. Simulate the following CPU scheduling algorithms.
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU
6. Working with different Unix commands, Pipes, I/O redirection.
7. Write Shell Programs for the following
   a) Display all the words which are entered as command line arguments.
   b) Changes Permissions of files in PWD as rwx for users.
   c) To print the list of all sub directories in the current directory.
   d) Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
   e) Program which takes two file names as arguments, if their contents are same then delete the second file.
8. Write shell scripts for the following
   a) To print the given number in the reversed order.
   b) To print first 25 Fibonacci numbers.
   c) To print the Prime numbers between the specified range.
   d) To print the first 50 Prime numbers.
9. Write shell scripts for the following
   a) To print gcd of a given number.
   b) To print the reverse of rows and columns of a matrix.
   c) To print the scalar product of two vectors.
10. Write shell scripts for the following
   a) To delete all lines containing the word ‘unix’ in the files supplied as arguments.
   b) Menu driven program which has the following options.
      i) contents of/etc/password
      ii) list of users who have currently logged in.
      iii) present working directory.
      iv) exit.
   d) For sorting, searching and insertion, deletion of elements in the list

CSM 252 **DATA STRUCTURES LAB** **L T P C**
0 0 3 1.5

LIST OF EXPERIMENTS

1. Code the following list ADT operations using array.

(a) voidis_emptyList(List 1) (b) List makeNullList(size n)

(c) Position firstPost(List 1) (d) Position endPost(List 1)

(e) Position nextPost(List 1, Position p) (f) Position prevPos(List 1, position p)

(g) Position find)List 1, Element x) (h) Position findKth(List 1, int k)

(i) void insert(List 1, Position p) (j) void delete(List 1, Position p)

(k) void append(List 1, Element x) (l)intcmp(List1,Position p1,Position p2)

(m) int cmp2(List11, List, Position p1, Position p2)

(n) void swap(List 1, Position p1, Position p2)

(o) Element retrieveElement(List 1, Position p)

(p) void print element(List 1, Position p)

2. Code the following list ADT operations using single linked list.

(a) voidis_emptyList(List 1) (b) List makeNullList(size n)

(c) Position firstPost(List 1) (d) Position endPost(List 1)

(e) Position nextPost(List 1, Position p) (f) Position prevPos(List 1, position p)

(g) Position find)List 1, Element x) (h) Position findKth(List 1, int k)

(i) void insert(List 1, Position p) (j) void delete(List 1, Position p)

(k) void append(List 1, Element x) (l)intcmp(List1,Position p1,Position p2)

(m) int cmp2(List11, List, Position p1, Position p2)

(n) void swap(List 1, Position p1, Position p2)

(o) Element retrieveElement(List 1, Position p)

(p) void print element(List 1, Position p)

3. Code the following list ADT operations using double linked list.

(a) voidis_emptyList(List 1) (b) List makeNullList(size n)

(c) Position firstPost(List 1) (d) Position endPost(List 1)

(e) Position nextPost(List 1, Position p) (f) Position prevPos(List 1, position p)

(g) Position find)List 1, Element x) (h) Position findKth(List 1, int k)

(i) void insert(List 1, Position p) (j) void delete(List 1, Position p)

(k) void append(List 1, Element x) (l)intcmp(List1,Position p1,Position p2)

(m) int cmp2(List11, List, Position p1, Position p2)

(n) void swap(List 1, Position p1, Position p2)

(o) Element retrieveElement(List 1, Position p)

(p) void print element(List 1, Position p)

4. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list.
5. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
6. Implement stack ADT and write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Extend the program to handle parenthesized expression also.
7. Implement Queue ADT and write a program that performs Radix sort on a given set of elements.
8. Implement the following sorting operations:

   (a) Shell Sort (b) Heap Sort (c) Merge Sort (d) Quick Sort

9. Implement Binary search Tree ADT and write a program that interactively allows

   (a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations

10. Implement AVL Tree ADT and Write a program that interactively allows
    (a) Insertion (b) Deletion (c) Find_min (d) Find_max

CSM 253 MICROPROCESSORS & MICROCONTROLLERS LAB **L T P** C

0 0 31.5

LIST OF EXPERIMENTS

1. Write an ALP to Add and Subtract two numbers
2. Write an ALP to multiply and divide two numbers
3. Write an ALP to find out Largest, smallest no, and even or odd from the given sequence of numbers.
4. Write an ALP to sort the given numbers in ascending and descending order.
5. Write an ALP to verify the given number is Armstrong and strong number.
6. Write an ALP to print n Fibonacci numbers.
7. Write an ALP to find out no of 1s and 0s in a given data
8. Write an ALP to string Manipulations like String Transfer, String Reversing, and Search for a String.
9. Write an ALP to verify the given string is palindrome or not
10. Write an ALP to interface 8255
11. Write an ALP to interface 8257
12. Write an ALP to interface 8259

SECOND YEAR SECOND SEMESTER

CSM 221	Mathematics - IV	L	T	P	C
		3	0	0	3

Course Objectives:

- To study the concepts of curvature, envelopes and curve tracing.
- To introduce Laplacian transformation techniques for solving ordinary differential equations.
- To educate the students about Z-transforms and its applications in engineering.
- To learn different numerical methods to solve nonlinear algebraic equations
- To provide the learners with basic concepts and techniques of numerical computing to deal with real world application.

UNIT- I

Radius of Curvature and Curve Tracing:

Curvature: Radius of curvature - Cartesian curves - parametric equations - at origin - Newton's formula - polar curves - pedal curves - centre of curvature - circle of curvature- Evaluates - Envelopes. Increasing and decreasing functions - Maxima and Minima - practical problems - Asymptotes - Curve tracing- Cartesian- parametric and polar curves.

UNIT- II

Laplace Transforms:

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function. Inverse Laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

UNIT- III

Z-Transforms:

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem, solution of difference equations using Z-transforms.

UNIT- IV

Numerical Solutions of Equations:

Introduction - Solution of Algebraic and Transcendental Equations - Bisection method- Newton- Raphson Method - iterative Methods.

Finite Differences and Interpolation:

Finite Differences – Differences of a polynomial – factorial notation – relations between operators – Newton's Interpolation formulae – central difference interpolation formulae - Gauss interpolation formulae – stirlings formula - interpolation with unequal intervals – Lagrange's interpolation – inverse interpolation.

UNIT- V

Numerical Integration and Solution of Ordinary Differential Equations:

Numerical Integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth. Numerical Solution of Ordinary Differential Equations: Introduction – Picard's Method- Euler's Method Runge- Kutta Method of fourth order.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 43 edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, 8th edition, New Age International (P) Ltd

References:

1. N. P. Bali, A text book of Engineering Mathematics, Lakshmi publications
2. S. S. Sastry, Introductory Methods of Numerical Analysis, 5th edition, PHI learning (P) Ltd
3. N. P. Bali, Satyanarayana Bhvanari and Indrani Keller, Lakshmi Publications, New Delhi.
4. Anthony C. Grove, An introduction to Laplace transform and the Z-transform, Prentice Hall, New York. (1991).

CSM 222 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

Course Objectives:

- Capability of maintaining huge amount of data.
- Design various database system and learn about different database models and their relationships.
- To reduce the redundancy of data using the normal forms.
- To learn about transaction management and Recovery mechanism.

UNIT-I

Introduction to Databases-Introduction, An Example, Characteristics of Database approach, Advantages of using DBMS approach, When not to use a DBMS Database System.

Concepts and Architecture: Data models, Schemas and instances, Three schema architecture and data independence Database languages and interfaces, The database system environment, Various components of a DBMS.

SQL-SQL Data Definition and Data Types specifying basic constraints in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL, nested queries - correlated and uncorrelated, notion of aggregation, aggregation functions group by and having clauses embedded SQL. Specifying Constraints as Assertions and Triggers, Views (Virtual Tables) in SQL, Schema Change Statement in SQL.

UNIT-II

NO SQL-Overview, History of NoSQL Databases, Definition of the Four Types of NoSQL Database, Different NOSQL Tools, SQL vs NOSQL.

E/R Model - Conceptual data modelling -Motivation, entities, entity types, various types of attributes, relationships, relationship types, E/R diagram notation, examples.

UNIT-III

Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys.

Relational algebra operators: selection, projection, cross product, various types of joins, division, example queries, Tuple relation calculus, Domain relational calculus, converting the database specification in E/R notation to the relational schema.

UNIT-IV

Dependencies and Normal forms - Importance of a good schema design, problems encountered with bad schema designs, motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, multi-valued dependencies and 4NF, join dependencies and definition of 5NF.

UNIT-V

Transaction Processing, Concurrency Control, and Recovery-Transaction Processing, Concurrency Control, and Recovery: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Two-Phase Locking Techniques for Concurrency Control, Recovery Concepts ,NO-UNDO/REDO Recovery Techniques based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, The ARIES Recovery Algorithm.

Text Books:

1. Fundamentals of Database Systems, Ramez Elmasri and Navate Pearson Education, 6th edition.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.

References:

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, 6th edition.
2. An Introduction to Database Systems, C.J.Date, A.Kannan, S.Swamynathan, Pearson Education,8th edition.

CSM 223 **JAVA PROGRAMMING** **L T P C**

3 0 0 3

Course Objectives:

- The course provides fundamentals of object-oriented programming in Java and development of user interface
- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

UNIT- I

Introduction: Introduction to java, The History and Evolution of Java, Java Buzzwords, java program structure, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, The primitive types, variables, Automatic Type Promotion in Expressions, finals & blank finals.

OOP Concepts : Oriented Languages-Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism, Procedural languages Vs. OOP.

Classes and Objects : Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

UNIT- II

Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.

Strings: Exploring the String class, String buffer class, Command-line arguments.
Library: Date class, Collection, Enumerations and Wrapper classes.

UNIT- III

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

Multithreading : Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiplethreads, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

I/O Streams: Streams, Byte streams, Character streams, File class, File streams.

UNIT- IV

Applets: Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

AWT: AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menubar.

UNIT- V

Swing-I – swings introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields,buttons – The JButton class, Check boxes, Radio buttons.

Swing- II: Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

JDBC Conectivity : Jdbc connectivity , types of Jdbc Drivers, connecting to the database, Jdbc Statements, Jdbc Exceptions, Manipulations on the database, Metadata .

Text Books:

1. The Complete Reference Java J2SE 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons,Pearson Edu.
3. Object Oriented Programming with C++, Balaguruswamy, TMH
4. Mastering Object-Oriented Programming with C++, R.S. Salaria, Khanna Book Publishing, N.Delhi

Reference Books:

1. JAVA Programming, K. Rajkumar,1/e, Pearson,2013.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, 1/e, Dream Tech, 2012.
3. Programming with Java, Balaguruswamy, TMH
4. Object Oriented Programming in C++ and Java, D.Samantha, PHI
5. Internet and Java Programming, Tanweer Alam, Khanna Publishing House

CSM 224 DESIGN & ANALYSIS OF ALGORITHMS L T P C

3 0 0 3

Course Objectives:

- To analyze the asymptotic performance of algorithms
- Ability to choose appropriate algorithm design techniques for solving problems
- To design and implement various programming paradigms and its complexity
- To analyze the problems using shortest path algorithms.

UNIT- I

Introduction: Algorithm Design paradigms – motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations.

Divide and Conquer: Structure of divide and conquer, Binary Search, Merge sort, Quick sort, Strassen Matrix Multiplication; Analysis of divide and conquer run time recurrence relations.

UNIT- II

Greedy Method: Overview, Knapsack problem, Job sequencing with deadlines, Minimum Spanning Tree (Prim's and Kruskal's algorithms), Single source shortest path Algorithms (Dijkstra's Algorithm, Bellman-Ford algorithm).

UNIT- III

Dynamic Programming: Overview, difference between dynamic programming and DAC, difference between dynamic programming and Greedy Method. All-pair Shortest path, Matrix-chain multiplication, Traveling Salesman Problem, longest Common sequence.

UNIT- IV

Back tracking: Overview, N-queen problem, sum of subsets, Graph Coloring, Hamiltonian Cycle and Knapsack problem.

UNIT- V

Branch and Bound: 0/1 Knapsack problem using LIFO branch and bound, FIFO branch and bound, Travelling Salesman Problem.

Computational Complexity: Complexity measures, Polynomial Vs Non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Text Books:

1.E. Horowitz, S. Sahni and S.Rajsekran, "Fundamentals of Computer Algorithms", Galgotia Publication.

2. Design & Analysis of Algorithms, S. Sridhar, Oxford

3. Design & Analysis of Algorithms, Sharma, Khanna Publishing House, N.Delhi

Reference Books:

1.T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer Algorithm", PHI.

2. Sara Basse, A.V. Gelder, "Computer Algorithms", Addison Wesley.

3. E.Sreenivasa Reddy,"Design and Analysis of Algorithms", Sci-Tech Publications.

CSM 225 PROFESSIONAL ETHICS AND HUMAN VALUES L T P C

3 0 0 3

Course Objectives:

- To learn moral values.
- To learn Human values.
- To have an idea on Engineering Ethics .
- To study various types of negative and positive faces of Engineering Ethics.

UNIT- I

Human Values: Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT- II

Engineering Ethics: The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics- Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

Engineering as Social Experimentation: Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT- III

Engineers' Responsibility for Safety and Risk Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk-Safety and the Engineer – Designing for Safety – Risk- Benefit Analysis-Accidents.

UNIT- IV

Engineers' Responsibilities and Rights Collegiality-Techniques for Achieving Collegiality – Two Senses of Loyalty- obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self- interest, Customs and Religion- Ethical egoism-Collective bargaining- Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe- examples of Gifts v/s Bribes-problem solving-interests in other companies- Occupational Crimes-industrial espionage-price fixing-endangering lives-Whistle Blowing-types of whistle blowing-when should it be attempted- preventing whistle blowing.

UNIT- V

Global Issues

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics- computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics- Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

Text Books:

1. "Engineering Ethics & Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
3. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
4. Professional Ethics and Human Values, Premvir Kapoor, Khanna Book Publishing

Reference Books:

1. "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
2. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran- Laxmi Publications
3. "Professional Ethics and Human Values" by Prof. D.R. Kiran.
4. "Indian Culture, Values and Professional Ethics" by PSR Murthy- BS Publication.
5. A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, Delhi

CSM 261 DATABASE MANAGEMENT SYSTEMS LAB L T P C
0 0 3 1.5

LIST OF EXPERIMENTS

1. Introduction to Oracle, Creation of table, data types, Displaying table definition using DESCRIBE, inserting rows into table and SELECT command.

2. Projection, ORDER BY clause, Altering and dropping of tables (use constraints while creating tables) examples using SELECT command.

3. Queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.

4. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views. SUBQUERIES(Multiple Subqueries, Nested subqueries)

5. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date).

6. a) Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found).

b) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

c) CONTROL STRUCTURES (IF statement, Loop…End Loop, Exit command, While Loop, For loop, Goto statement).

8. a) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

b) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

9. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

10. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

CSM 262	JAVA PROGRAMMING LAB	L T P C
		0 0 3 1.5

LIST OF EXPERIMENTS

1. Write a java program to demonstrate static member, static method and static block.
2. Write a java program to demonstrate method overloading and method overriding.
3. Write a java program to demonstrate finals, blank finals, final methods and final classes.
4. Write a java program to implement inheritance.
5. Write a java program to create user defined exception class and test this class.
6. Write an applet program to demonstrate Graphics class.
7. Write GUI application which uses awt components like label, button, text field, text area, choice, checkbox, checkbox group.
8. Write a program to demonstrate Mouse Listener, Mouse Motion Listener, Keyboard Listener, Action Listener, Item Listener.
9. Develop swing application which uses JTree, Jtable, JComboBox.
10. Write a JDBC Application to implement DDL and DML commands.

CSM 263 **ALGORITHMS LAB** **L T P C**

0 0 3 1.5

LIST OF EXPERIMENTS

1. Write a program to implement strassen's matrix multiplication problem.
2. Write a program to obtain the topological ordering of vertices in a given Graph.
3. Compute the transitive closure of a given directed graph using Warshalls Algorithm.
4. You have a business with several offices; you want to lease Broadband to connect them up with each other; and the company charges different amounts of money to connect different pairs of cities. You want a set of lines that connects all your offices with a minimum total cost. It should be a spanning tree, since if a network isn't a tree you can always remove some edges and save money. Implement the above problem.
5. Write a program From a given vertex in a weighted connected graph, Find shortest paths to other vertices using Dijkstras Algorithm.
6. Write a program to implement the knapsack problem using Dynamic Programming.7 Write a program to implement the sum of subsets problem using back tracking.
8. Write a program for Bellman-Ford algorithm for single source shortest path.
9. Implement N-Queen Problem using Backtracking.
10. Programs involving some advanced data structures.

CSM 311 ARTIFICIAL INTELLIGENCE L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the basic principles, techniques, and applications of Artificial Intelligence.
- To understand the building blocks of AI such as search, knowledge representation, inference,logic and learning.
- Enable students to develop a small AI system for real time problems.

UNIT– I

INTELLIGENT SYSTEMS: What is AI; The foundations for AI; The history of AI; The state of theart;

Intelligent Agents agents and environments, the concept of rationality, the nature of environments,the structure of agents.

UNIT – II

PROBLEM SOLVING: Solving problems by searching-problem solving agents, searching for solutions;

Uninformed Search Strategies-BFS, DFS, UCS, IDS, BS; Informed Search Strategies-best first search,greedy search, A*, AO* algorithms, hill climbing; Adversarial Search-games, optimal decisions in games, alpha beta pruning.

UNIT – III

KNOWLEDGE REPRESENTATION: Logical Agents- knowledge based agents, the wumpus world, logic, propositional logic, propositional theorem proving, agents based on propositional logic; Firstorderlogic-representation- revisited, syntax and semantics, knowledge engineering in first order logic; Inference in FOL-propositional vs FOL, unification and lifting, forward chaining, backward chaining, resolution.

UNIT – IV

PLANNING: The Planning problem- planning with state space search; Partial order planning; Planninggraphs; Planning with propositional logic; Analysis with planning approaches.

UNIT – V

LEARNING: Forms of learning- supervised learning, unsupervised learning, reinforcement learning,ensemble learning, learning decision trees; Artificial Neural networks; Expert Systems; Machine Learning; Natural language processing.

TEXT BOOKS:

1. Stewart Russell and Peter Norvig, "Artificial Intelligence-A Modern Approach", 3rd edition,Pearson Education/ Prentice Hall, 2010.
2. Ivan Bratko, "Prolog Programming for Artificial Intelligence", 4th edition, Addison Wesley,2011.
3. Saroj Kaushik, "Logic And Prolog Programming", 1ST edition, New Age InternationalPublishers, 2002.

REFERENCE BOOKS:

1. Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence" 3rd edition,Tata MCGraw, 2013.
2. George F Luger, "Artificial Intelligence"5th edition, Pearson Education, 2009.
3. Dan W Patternson, "Introduction to Artificial Intelligence and Expert systems", 2nd edition,PHI learning, 2005.

CSM 312 **SOFTWARE ENGINEERING** **L T P C**

3 0 0 3

Course Objectives:

- To comprehend the various software process models.
- To understand the types of software requirements and SRS document.
- To know the different software design and architectural styles.
- To learn the software testing approaches and metrics used in software development.

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, Process patterns, process assessment.

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, Agility and Agile Process model, Extreme Programming, Other process models of Agile Development and Tools

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. UML Diagrams.

UNIT-III

Design Engineering: Design process and Design quality, Design concepts, the design model. **Creating an architectural design:** Software architecture, Data design, Architectural styles and patterns, Architectural Design. Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

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.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

UNIT-V

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, The Capability Maturity Model Integration (CMMI), Software reliability, The ISO 9000 quality standards.

Text books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw 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.

4. Desikan and G. Ramesh, "Software Testing: Principles and Practices", 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 Meiler page-Jones: Pearson Education

4. Rajib Mall, Fundamentals of Software Engineering, Prentice Hall India

CSM 313 AUTOMATA THEORY AND FORMAL LANGUAGES L T P C

3 0 0 3

Course Objectives:

- Introduce concepts in automata theory and theory of computation.
- Identify different formal language classes and their relationships.
- Design grammars and recognizers for different formal languages.
- Prove or disprove theorems in automata theory using its properties.

UNIT – I

Automata, Formal Languages & Grammar Hierarchy: Introduction to Automata, The central concepts of automata theory - Alphabets, Strings, Languages, Types of Automata, Types of Languages, Types of Grammars, Relationship between Automata, Grammars and Languages.

Finite Automata: An Informal picture of finite automata. Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Acceptance of DFA, Extended transition function, the language of DFA, Design of DFA for the string acceptance(Like, Design a FA with $\sum = \{0, 1\}$ accepts those string which starts with 1 and ends with 0).

UNIT – II

Non deterministic finite automata (NFA) – Definition of NFA, NFA processing strings, Notations for NFA, Acceptance of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA Finite, Design of NFA for the string acceptance(Like, NFA with $\sum = \{0, 1\}$ and accept all string of length atleast 2) .

Automata with € transitions: Use of € - transition, notation for an € - NFA, Epsilon closures, extended transitions and languages, Conversion of epsilon NFA to NFA and DFA.

Transducers: Design of a Moore Machine and Mealy Machine, Conversion of Moore to Mealy, Conversion of Mealy to Moore.

UNIT – III

Minimization of DFA: Minimization of automata, 2DFA, DFA vs. 2DFA.

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions. Regular Languages, Languages Associated with Regular Expression. Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages.

Finite Automata and Regular Expressions: Arden's Theorem, Equivalence of Finite Automata and Regular Expressions, Cycle of Constructions, Equivalence of DFA and Regular Expressions, Equivalence of NFA and Regular Expressions.

UNIT – IV

Context Free Grammars and Context free languages: Types of Grammar, derivations and Parse Trees, Ambiguous and Unambiguous Grammars. the pumping lemma for context free languages. closure properties for context free languages, Decision properties for CFL's.

Simplification of Context - Free Grammar: Elimination of ϵ - Productions, Elimination of Unit Productions, Elimination of Useless Symbols, Normal Forms for Context Free Grammars, Chomsky Normal Form, Greibach Normal Form, Application of Context-Free Grammars, Cock-Younger-Kasami Algorithm.

UNIT – V

Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's. Acceptance of context free languages, Acceptance by final state and acceptance by empty Stack.

Turing Machines & Computability: Introduction to Turing Machines, Configurations, Moves of a TM, Language accepted by a TM, Halting Vs. Looping. Multi-tape Turing machines. Recursive and Recursively enumerable languages, programming techniques for Turing machines.

Undecidability: Undecidability of Halting Problem, Reductions, Introduction to Theory of NP-completeness. Post's Correspondence problem.

Textbooks:

1. Nasir S.F.B, P.K. Srimani, "A Text Book on Automata Theory", 1/e, Foundation Publications Cambridge University Press, 2014.
2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and computation", 3/e, PEA, 2009.

References:

1. Cohen, 'Computer Theory', KLP Mishra & N.Chandrasekharan, 'Theory of Computation', PHI.
2. H.R.Lewis, C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education, 2003.
3. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill, 2003.
4. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
5. Ragade, "Automata and Theoretical Computer Science", First Edition, Pearson Education, 2004.

CSM 314 (A) PE-1 : CLOUD COMPUTING (MOOCS)

Week 1: Introduction to Cloud Computing
Week 2: Cloud Computing Architecture
Week 3: Service Management in Cloud Computing
Week 4: Data Management in Cloud Computing
Week 5: Resource Management in Cloud
Week 6: Cloud Security
Week 7: Open Source and Commercial Clouds, Cloud Simulator
Week 8: Research trend in Cloud Computing, Fog Computing
Week 9: VM Resource Allocation, Management and Monitoring
Week 10: Cloud-Fog-Edge enabled Analytics
Week 11: Serverless Computing and FaaS Model
Week 12: Case Studies and Recent Advancements

CSM 314 (B) PE-1 : ADVANCED DISTRIBUTED SYSTEMS (MOOCS)

Week 1 : Epidemic and gossip based algorithms
Week 2 : Napster and Gnutella
Week 3 : DHTs: Chord, Pastry and BitTorrent
Week 4 : Logical clocks, Mutual Exclusion Algorithms
Week 5 : Distributed Leader Election
Week 6 : Distributed minimum spanning tree, the FLP result
Week 7 : Consistency models and the CAP theorem
Week 8 : Paxos and Raft
Week 9 : Byzantine General's Problem, Virtual synchrony
Week 10 : Bitcoin and Blockchains
Week 11 : Amazon Dynamo, Facebook Cassandra, Google Percolator
Week 12 : Voldemort (LinkedIn), Condor, and Microsoft DryadLINQ

CSM 314 (C) PE-1: WEB-BASED TECHNOLOGIES AND MULTIMEDIAAPPLICATIONS (MOOCS)

BLOCK-1 : INTERNET CONCEPTS

Week-1: Internet : An Overview
Week-2: Concepts of Web Browser
Week-3: Internet Search
Week-4: What can we do using Internet

BLOCK-2: WEB PAGE DESIGN

Week-5: Introduction to HTML, Tools for Web Page Designing
Week-6: Designing of Frames and Forms

BLOCK-3: INTRODUCTION TO MULTIMEDIA

Week-7: An Overview of Multimedia
Week-8: Multimedia Design, Production and Distribution
Week-9: Applications of Multimedia
Week-10: Distributed Environment
Week-11: Multimedia Authoring Tools (Part-1)
Week-12: Multimedia Authoring Tools (Part-2)

CSM 314 (D) PE-1: DATA STRUCTURE AND ALGORITHMS USING JAVA (MOOCS)

Week 1: 1D array, list and vector, 2D matrices and tables of objects
Week 2: Java implementation of 1D and 2D arrays and its operations
Week 3: Linked lists and its various operations, stack and queue
Week 4: Java implementation of linked lists, stack and queue
Week 5: Binary trees: Representation and operations. Variations of binary tree: Binary search tree, Height balanced search tree, Heap tree
Week 6: Java implementation of binary trees and its variations
Week 7: Graph : Structure, representation and operations
Week 8: Java implementations of graph data structures
Week 9: Algorithms (Part-I): Searching and sorting algorithms
Week 10: Java implementation of Part-I algorithms
Week 11: Algorithms (Part-II): Greedy algorithms, shortest path algorithms
Week 12: Java implementation of Part-II algorithms

CSM 316 **CONSTITUTION OF INDIA** **L T P C**
2 0 0 0

UNIT I

Introduction to Indian Constitution: Meaning of the term Constitution. Making of Indian Constitution: Constitutional history, Drafting Committee and Sources,Philosophy of Indian Constitution: Preamble and Features. Citizenship, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure : Organs of the Government :Legislative, Executive and Judiciary. The term Federalism and Centre-State relationship. President: Role, power and position. Prime Minister and Council of ministers, Cabinet, Central Secretariat, Lok Sabha, Rajya Sabha. The Supreme Court and High Court: Powers and Functions.

UNIT III

State Government and its Administration: Governor: Role and Position. Chief Minister and Council of ministers.
State Secretariat: Organization, Structure and Functions.

UNIT IV

Local Administration: District's Administration: Head and his/her Role and Importance. Urban administration: Municipalities - Mayor and role of Elected Representative, CEO of Municipal Corporation.
Rural administration: Pachayati Raj and its Functions. PRI: Zilla Panchayat , Elected officials and their roles, CEO of Zilla Panchayat. Block level Organizational Hierarchy (Different departments), Village level administration: Role of Elected and Appointed officials. Importance of grass root democracy.

UNIT V

Election Commission: Role of Chief Election Commissioner and Election Commissionerate, State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. Introduction to the Constitution of India, Durga Das Basu PHI, New Delhi
2. Indian Constitution, Subash Kashyap, National Book Trust 3. Dynamics of Indian Government & Politics,J.A.Siwach.

REFERENCE BOOKS:

1. Constitutional Law of India, 4th edition in 3 volumes, H.M.Sreevai, Universal Law Publication
2. Indian Government and Politics, J.C. Johari
3. Indian Government and Politics, J. Raj
4. Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, M.V. Pylee, PHI, New Delhi
5. Challenges to Civil Rights Guarantees in India, A.G.Noorani, A.G.,Oxford University Press 2012
6. Indian Government and Politics,D.C. Gupta

CSM 351 **ARTIFICIAL INTELLIGENCE LAB** **L T P C**
0 0 3 1.5

LIST OF EXPERIMENTS

1. Write a PROLOG program to implement Vacuum Cleaner Agent.
2. Write a PROLOG program to implement BFS, DFS.
3. Write PROLOG program to implement 8-Puzzle problem using A* algorithm.
4. Write a PROLOG program to implement n queens problem.
5. Write a PROLOG program to implement MIN-MAX algorithm.
6. Write a PROLOG program to represent simple fact for a statement.
7. Write a PROLOG program to represent a graph and apply BFS on it.
8. Write a PROLOG program for backward and forward reasoning.
9. Write a PROLOG program containing facts related to following predicates
Location (city, state)
Stays (person, city)
Display: (i) list of persons, state and city (ii) Given person, find the state in which he is staying.
10. Write a PROLOG program that answers about family members and relationships. Include predicates & clauses which define sister, brother, father, mother, Grandchild, grandfather and uncle. The program should be able to answer question such as following.
a. Father (X, bob)
b. Grandson (X, Y)
c. Uncle (bill, Sue)
d. Mother (marry, X)
11. write a PROLOG program to implement an inductive learning algorithm for decision trees.

CSM 352 **SOFTWARE ENGINEERING LAB** **L T P C**

0 0 3 1.5

LIST OF EXPERIMENTS

Course Objectives:

The objective of this lab is to acquire the generic software development skill through various stages of software life cycle and also to ensure the quality of software through software development with various protocol based environment

Course Outcomes:

- By the end of this lab the student is able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project
- Prepare SRS document, design document, test cases and software configuration management and risk management related document.
- Develop function oriented and object oriented software design using tools like rational rose.
- Use modern engineering tools necessary for software project management, estimations, time management and software reuse
- Generate test cases for software testing

1) Perform the following, for the following experiments:

i. Do the Requirement Analysis and Prepare SRS

ii. Draw E-R diagrams, DFD, CFD and structured charts for the project.

1) Course Registration System

2) Students Marks Analyzing System

3) Online Ticket Reservation System

4) Stock Maintenance

5) Consider any application, using COCOMO model, estimate the effort.

6) Consider any application, Calculate effort using FP oriented estimation model.

7) Draw the UML Diagrams for the problem 1,2, 3, 4.

8) Design the test cases for e-Commerce application (Flipcart, Amazon)

9) Design the test cases for a Mobile Application (Consider any example from Appstore)

10) Design and Implement ATM system through UML Diagrams.

CSM 321 **COMPUTER NETWORKS** **L T P C**

3 0 0 3

Course Objectives:

- Build an understanding of the fundamental concepts of data communication and computer networking.
- Understand how errors detected and corrected that occur in transmission
- How collisions to be handled when many stations share a single channel
- Know about routing mechanisms and different routing protocols

UNIT I

Introduction: Uses of Computer Networks, Network Topology, Network Hardware, LANs, MANs, WANs, Network Software.
Reference Models: The OSI Reference Model, TCP/IP Reference Model, the comparison of OSI and TCP/IP reference models.
The Physical Layer: Guided transmission media: Magnetic Media, Twisted Pair, Coaxial Cable, and Fiber Optics.

UNIT II

The Data Link Layer: Data link layer design issues, Error detection and correction, Elementary data link protocols, and Sliding window protocols.
The Medium Access Control Sub layer: The channel allocation problem, multiple access protocols, ETHERNET and Wireless LANs.

UNIT III

The Network Layer: Network Layer Design Issues, Routing Algorithms: Shortest Path, Flooding, DVR, and Link State routing algorithm, Congestion Control Algorithms, and Quality of Service. IP protocol and IP address.

UNIT – IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, and the Internet Transport Protocols: UDP- Remote Procedure Call, The Real-Time Transport Protocol, TCP-Introduction to TCP, The TCP Service model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Transmission Policy, Congestion Control, TCP Timer Management.

UNIT – V

Application Layer: The Domain Name System (DNS) – Resource Records, Name Servers, E-Mail – Architecture and Services, POP3, IMAP, World Wide Web – Architectural Overview, Server side, Uniform Resource Locators, Statelessness and Cookies.

Text Book:

1. Andrew S Tanenbaum, Computer Networks.4 ed, Pearson Education / PHI.

Reference Books:

1. Behrouz A.Forouzan, Data Communications and Networking. 4 ed, TATA McGraw Hill
2. Kurose and Ross, Computer Networks – A Top-down Approach Featuring the Internet. Pearson Education.

CSM 322 **DATA MINING AND DATA WAREHOUSING** **L T P C**
3 0 0 3

Course Objectives:

- This course gives an introduction to methods and theory for development of data warehouses and data analysis using data mining.
- Data quality and methods and techniques for pre-processing of data.
- Understand and apply various algorithms for finding frequent item sets.
- Algorithms for classification, clustering and association rule analysis.

UNIT – I

Data Warehouse – Introduction, A Multi-dimensional data model, Data WarehouseArchitecture, Data Warehouse Implementation.

Data Mining – Introduction, Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT – II

Data Pre-processing – Data cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy Generation, Data Mining Primitives.

Mining Frequent Patterns, Associations, and Correlations - Basic concepts, Frequent Itemset Mining methods(Apriori and FP-Growth algorithms).

UNIT – III

Cluster Analysis – Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

UNIT – IV

Classification & Prediction – Introduction, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy.

UNIT-V

Mining Complex Type of Data – Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

Textbooks:

1. Data Mining Concepts & Techniques – Jiawei Han Micheline Kamber – Morgan Kaufmann Publishers.
2. Data Warehousing in the real world – A Practical guide for Building decision support systems – Sam Anahory, Dennis Murray – Pearson Education.

Reference Books:

1. Data Warehouse Toolkit – Ralph Kinball – John Wiley Publishers.
2. Data Mining (Introductory and Advanced Topics) – Margaret H.Dunham – Pearson Education.
3. Introduction to Data Mining with case studies – G.K.Gupta, PHI Publications, 2006

CSM324 (A) **PE-2: COMPILER DESIGN** **L T P C**
3 0 0 3

Course Objectives:

- Create an overall view of various types of translators, linkers, loaders, and phases of a compiler.
- Understand the Syntax Analysis, Various types of Parsers, like the Top-Down approach, and the Bottom- Up approach parsers.
- Gives a view of Intermediate Code Generation, Type Checking, Understand the role of Symbol Table and its organization.
- Describe Code Generation, Machine Independent Code Optimization and Instruction Scheduling.

UNIT – I

Introduction to Compiler: Pre-processor, compiler, assembler, interpreter, linker &loader and phases of a compiler. Phases and passes, Bootstrapping.

Lexical Analysis: Finite state machines and regular Expressions and their applications to lexical analysis, Implementation of lexical analyzers, Lexical-analyzer generator, LEX compiler, YACC Compiler, Implementation of a subset of C using YACC.

UNIT – II

Syntax Analysis: CFG, LMD, RMD, ambiguity, parse tree, role of the parser, Classification of Parsing Techniques: Brute Force approach, left recursion, left factoring.

Top-down parsing: FIRST and FOLLOW, LL (1) grammars, non-recursive predictive parsing and error recovery in predictive parsing.

UNIT – III

Types of Bottom-Up Approaches: Introduction to bottom-up parser, Why LR Parsers?, model of an LR parsers, operator precedence parser, shift- reduce parser, difference between LR and LL Parsers, Construction of SLR Table. More Powerful LR parsers: Construction of CLR (1),LALR parsing table, dangling ELSE ambiguity, and error recovery in LR parsing and comparison of all bottom-up approaches with all top-down approaches.

UNIT – IV

Syntax-directed Translation & Semantic analysis: SDT schemes, evaluation of semantic rules, three address codes - quadruples, triples, abstract syntax trees, types and declarations, type checking, procedures call.

Symbol Tables: Use and need of symbol tables, Data structure for symbols tables, representing scope information.

Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in Block structured language, heap management.

UNIT – V

Error Detection & Recovery: Lexical Phase errors, syntactic phase errors, semantic errors.

Code Generation: Issues, target machine, basic blocks and flow graphs, simple code generator, peep-hole optimization

Machine Independent code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Text Books:

1. Alfred V.Aho, Ravi Sethi, JD Ullman, ‘Compilers Principles, Techniques and Tools’, Pearson Education, 2007.

2. Torben Egidius Mogensen ‘Intruction to Compiler Design’ Pearson Education, 2011.

3. A Textbook on Automata Theory P.K.Srimani and Nasir S.F.B KLP Mishra & N.Chandrasekharan, ‘Theory of Computation’, PHI

References:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Engineering a Compiler-Cooper & Linda, Elsevier.

2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.O. G. Kakde; Compiler Design,4/e; Universities Press (2008)

3. John.E.Hopcroft, R.Motwani, & Jeffery.D Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2003

CSM324(B) **PE-2 : SOFT COMPUTING** **L T P C**

3 0 0 3

Course Objectives:

- To familiarize with soft computing concepts.
- To introduce the ideas of neural networks, fuzzy logic and use ofheuristics based on human experience.
- To introduce the concepts of Genetic algorithm and its applications tosoft computing using some applications.

UNIT-I

Introduction: Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron–Linear Separability– Hebb Network.

Supervised Learning Network: Perception Networks –Adeline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

UNIT-II

Associative Memory Networks: Training Algorithms for Pattern Association – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory – Hopfield Networks – Iterative Auto associative Memory Networks – Temporal Associative Memory Network.

Unsupervised Learning Networks: Fixed weight Competitive Nets –Kohonen Self Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Networks – Special Networks.

UNIT-III

Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations –Tolerance and Equivalence Relations – Non interactive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods.

UNIT-IV

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy Rule Base and Approximate Reasoning: Truth values and Tables in Fuzzy logic – Fuzzy Propositions – Formation of Rules – Decomposition and Aggregation of rules – Fuzzy Reasoning – Fuzzy Inference Systems (FIS) – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT-V

Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach – Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control.

Text books:

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007. ISBN: 10: 81-265-1075-7.

2. J.S.R.Jang, C.T.Sun and E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 2004, Pearson Education.

References:

2. S. Rajasekaran and G.A.V.Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, 2003.

CSM 324 (C) PE-2 : BIO-INFORMATICS **L T P C**

3 0 0 3

CSM 324 (D) **PE-2 : DISTRIBUTED SYSTEMS** **L T P C**
3 0 0 3

- Course Objectives:
- To understand the foundations of distributed systems.
- To learn issues related to clock Synchronization and the need for global state in distributed systems
- To learn distributed mutual exclusion and deadlock detection algorithms
- To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems
- To learn the characteristics of peer-to-peer and distributed shared memory systems

UNIT I:

Distributed Systems: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges.
A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications.
Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

UNIT II:

Message Ordering & Snapshots: Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels.

UNIT III:

Distributed Mutex & Deadlock: Distributed mutual exclusion algorithms: Introduction, Preliminaries, Lamport‘s algorithm, Ricart-Agrawala algorithm, Maekawa‘s algorithm, Suzuki–Kasami‘s broadcast algorithm. Deadlock detection in distributed systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp‘s classification, Algorithms for the single resource model, the AND model and the OR model.

UNIT IV:

Recovery & Consensus: Check pointing and rollback recovery: Introduction, Background and definitions, Issues in failure recovery, Checkpoint-based recovery, Log-based rollback recovery, Coordinated check pointing algorithm, Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition, Overview of results, Agreement in a failure, free system, Agreement in synchronous systems with failures

UNIT V:

Peer-to-peer computing and overlay graphs: Introduction, Data indexing and overlays, Chord – Content addressable networks, Tapestry.
Distributed shared memory: Abstraction and advantages, Memory consistency models, Shared memory Mutual Exclusion.

Text Books:

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, Fifth Edition, Pearson Education, 2012.
2. Distributed computing: Principles, algorithms, and systems, Ajay Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.

Reference Books:

1. Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall of India, 2007.
2. Advanced concepts in operating systems. Mukesh Singhal and Niranjan G. Shivaratri, McGraw-Hill, 1994.
3. Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M.,Pearson Education, 2007.

e-Resources:

1) https://nptel.ac.in/courses/106/106/106106168/

CSM325	MACHINE LEARNING	L T P C
		3 0 0 3

Course Objectives:

- The student will be able to describe why a particular model is appropriate in a given situation.
- The student will be able to analytically demonstrate how different models and different algorithms are related to one another.
- Student will be able to develop an appropriate algorithm from a given model and demonstrate the use of that method.
- Discuss how different methods relate to one another and will be able to develop new and appropriate Machine Learning methods appropriate for particular problems.

UNIT-I

Introduction to machine learning: Concept Learning and the General to Specific Ordering: Concept learning task, concept learning as search, Find-S: finding a Maximally Specific hypothesis, Version Spaces and the Candidate-Elimination algorithm, remarks on Version Spaces and Candidate-Elimination and inductive bias.

Decision Tree Learning: Decision Tree representation, appropriate problems for Decision Tree learning, hypothesis space search in Decision Tree learning, inductive bias in Decision Tree learning and issues in Decision Tree learning.

UNIT-II

Artificial Neural Networks: Neural Network representations, appropriate problems for Neural Network learning, Perceptrons, Multilayer Networks and the Back propagation algorithm and remarks on the Back propagation algorithm.

Evaluating Hypotheses: Estimating hypothesis accuracy, basics of sampling theory, general approach for deriving confidence intervals, difference in error of two hypotheses and comparing learning algorithms.

UNIT-III

Bayesian Learning: Bayes theorem and concept learning, maximum likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classier, Gibbs algorithm, Naive Bayes classier, Bayesian belief networks and EM algorithm.

UNIT-IV

Computational learning theory: Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis spaces, and sample complexity for infinite hypothesis spaces and mistake bound model of learning.

UNIT-V

Instance Based Learning: Introduction, k-Nearest Neighbor learning, locally weighted regression, radial basis functions, Case Based Reasoning and remarks on Lazy and Eager learning.

Genetic Algorithms: Introduction, hypothesis space search, Genetic programming and models of evolution and learning.

Text books:

1. Tom M. Mitchell, “Machine Learning”, Mc. Graw Hill Publishing.

References:

1. Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

E-Resources:

1. Andrew Ng, “Machine Learning Yearning” https://www.deeplearning.ai/machine-learning- yearning/
2. Shai Shalev-Shwartz , Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms” , Cambridge University Press https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

CSM 361 **COMPUTER NETWORKS LAB** **L T P C**

0 0 3 1.5

LIST OF EXPERIMENTS

1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
2. Study of Network Devices in Detail.
3. Study of Network IP.
4. Connect the computers in Local Area Network.
5. Write a Program on Bit stuffing is a process of inserting an extra bit as 0, once the frame sequence encountered 5 consecutive 1's.
6. Program to implement Character Stuffing
7. Study of basic network command and Network configuration commands.
8. Performing an Initial Switch Configuration
9. Performing an Initial Router Configuration
10. Connecting a Switch
11. Examining WAN Connections.

CSM 362 **DATA MINING USING PYTHON LAB** **L T P C**
0 0 3 1.5

Course Objectives:

- Practical exposure on implementation of well-known data mining algorithms
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

Note: Use python library scikit-learn wherever necessary

1. Demonstrate the following data preprocessing tasks using python libraries.
a) Loading the dataset
b) Identifying the dependent and independent variables
c) Dealing with missing data
2. Demonstrate the following data preprocessing tasks using python libraries.
a) Dealing with categorical data
b) Scaling the features
c) Splitting dataset into Training and Testing Sets
3. Demonstrate the following Similarity and Dissimilarity Measures using python
a) Pearson's Correlation
b) Cosine Similarity
c) Jaccard Similarity
d) Euclidean Distance
e) Manhattan Distance
4. Build a model using linear regression algorithm on any dataset.
5. Build a classification model using Decision Tree algorithm on iris dataset
6. Apply Naïve Bayes Classification algorithm on any dataset
7. Generate frequent itemsets using Apriori Algorithm in python and also generate association rules for any market basket data.
8. Apply K- Means clustering algorithm on any dataset.
9. Apply Hierarchical Clustering algorithm on any dataset.
10. Apply DBSCAN clustering algorithm on any dataset.

Web Resources:

1. https://analyticsindiamag.com/data-pre-processing-in-python/
2. https://towardsdatascience.com/decision-tree-in-python-b433ae57fb93
3. https://towardsdatascience.com/calculate-similarity-the-most-relevant-metrics-in-a-nutshell-9a43564f533e
4. https://www.springboard.com/blog/data-mining-python-tutorial/
5. https://medium.com/analytics-vidhya/association-analysis-in-python-2b955d0180c
6. https://www.datacamp.com/community/tutorials/naive-bayes-scikit-learn
7. https://www.analyticsvidhya.com/blog/2019/05/beginners-guide-hierarchical-clustering/
8. https://towardsdatascience.com/dbscan-algorithm-complete-guide-and-application-with-python-scikit-learnd690cbae4c5d

CSM363	MACHINE LEARNING LAB	L T P C 0 0 3 1.5

Course Objectives:

To apply the techniques in applications which involve perception, reasoning and learning.

Python Libraries required: Sklearn Note: Standard datasets can be downloaded from UCI Machine Learning Repository (https://archive.ics.uci.edu/ml/datasets.php)

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement and demonstrate FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .csv file.
4. Implement k-nearest neighbours classification using python
5. For a given set of training data examples stored in a .csv file, implement and demonstrate the candidate elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
6. Write a program to demonstrate the working of the decision tree classifier. Use appropriate dataset for building the decision tree and apply this knowledge to classify a new sample.
7. Write a program to demonstrate the working of Decision tree regressor. Use appropriate dataset for decision tree regressor.
8. Write a program to demonstrate the working of Random Forest classifier.
9. Use appropriate dataset for Random Forest Classifier.
10. Write a program to demonstrate the working of Logistic Regression classifier. Use appropriate dataset for Logistic Regression.

CSM 411 (A)	PE-3 : DEEP LEARNING	L T P C
		3 0 0 3

Course Objectives:

1) Design Multi-Layer neural network to solve Supervised Learningproblems.
2) Design Auto encoders to solve Unsupervised Learning problems.
3) Apply Regularization methods Early stopping, data augmentation,dropout etc. for optimization results.
4) Apply Classical Supervised methods CNN'S, FCN, RCNN etc. forImage Denoising, Segmentation and Object detection problems.

UNIT-I

History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feed Forward Neural Networks, Back propagation.

UNIT-II

Optimizers: Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD; Principal Component Analysis and its interpretations, Singular Value Decomposition; Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders.

UNIT-III

Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Dropout, Drop connect; Greedy Layer wise Pretraining, Better activation functions, Better weight initialization methods, Batch Normalization; Learning Vectorial Representations of Words.

UNIT-IV

Convolutional Neural Networks, LeNet, AlexNet, ZFNet, VGGNet, GoogLeNet, ResNet; Recurrent Neural Networks, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs; Semantic Segmentation, Instance Segmentation, FCN, Unet.

UNIT-V

Object Localization, Region Proposal Networks, RCNN, RFCN, DeYolo; Encoder Decoder Models, Generative Adversarial Networks, GAN, VAE, One Shot Learning, Deep Reinforcement Learning, Attention Mechanism, Attention over images.

Text books:

1. Ian Goodfelllow, Yoshua Benjio, Aaron Courville, "Deep Learning", The MIT Press.
2. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.

References:

1. Charu C. Aggarwal, "Neural Networks and Deep Learning", Springer, 2018.
2. https://nptel.ac.in/courses/106/106/106106184

CSM 411 B PE-3 (B) NATURAL LANGUAGE PROCESSING L T P C
3 0 0 3

Course Objectives:

This course is designed to:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

UNIT I

Introduction to Natural language: The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

UNIT II

Grammars and Parsing: Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannon game, Entropy and Cross Entropy.

UNIT III

Grammars for Natural Language: Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT IV

Semantic Interpretation: Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling: Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

UNIT V

Machine Translation Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval: Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization: Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

TEXT BOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education
2. Multilingual Natural Language Processing Applications : From Theory To PracticeDaniel M.Bikel and Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi,Vineet chaitanya,Prentice – Hall of India.

REFERENCES BOOKS:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

CSM 411 (C) PE-3 : BLOCK CHAIN TECHNOLOGY L T P C

3 0 0 3

Course Objectives:

- Develop familiarity of current technologies, tools.
- Impart strong technical understanding of Block Chain technologies.
- Explore the Smart Contracts and Etherum implementation strategies.
- Introduce the current scenario and practical application areas of Hyper ledger.

UNIT-I

Block Chain 101- Distributed Systems, History of blockchain, Introduction to blockchain, Types of block chain, CAP theorem and blockchain, benefits and limitations of blockchain, **Decentralization**-Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Blockchain and full eco system decentralization, Smart contract, Decentralized Organizations, Decentralized autonomous organizations, Decentralized autonomous corporations, Decentralized autonomous societies, Decentralized applications, Platforms for Decentralization.

UNIT-II

Cryptography and Technical Foundations- Introduction, Cryptographic primitives, Asymmetric Cryptography, Public and Private-keys, Financial -market and trading, Summary.
Bitcoin- Bitcoin, Transactions, Blockchain, Bitcoin Payments.

UNIT-III

Smart Contracts- History, Definition, Recardian Contracts.

Ethereum 101-Introduction, Ethereum blockchain, Elements of the Ethereum block chain, Precompiled contracts, Accounts, Block, Ether, Messages, Mining, Clients and Wallets, Trading and investment, The Yellow paper, The Ethereum Network, Applications developed on Ethereum, Scalability and security issues.

UNIT-IV

Hyper Ledger- Projects, Hyperledger as a Protocol, Fabric, Hyperledger Fabric, Sawtooth lake, Corda,

UNIT-V

Alternative Block Chain- Block chains, Platforms.

Scalability and Other Challenges- Scalability, Privacy, Security,

Text books:

1. Seberrius Jeffery," Block Chain" 2nd Edition Publishers details 2015

References:

2. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.

3. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

CSE 411 (D) SOFTWARE PROJECT MANAGEMENT **L T P C**

3 0 0 3

Course Objectives:

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

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources withthe 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

The Old Way and The New: The principles of conventional software Engineering, principlesof modern software management, transitioning to an iterative process.
Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction,transition phases.
Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT III

Model Based Software Architectures: A Management perspective and technical perspective.
Work Flows of the Process: Software process workflows, Iteration workflows.
Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT IV

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.
Project Organizations and Responsibilities: Line-of-Business Organizations, ProjectOrganizations, evolution of Organizations.

UNIT V

Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.
Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

Text Books:

1. Software Project Management, Walker Royce, Pearson Education, 2005.
2. Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

Reference Books:

1. Software Project Management, Joel Henry, Pearson Education.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.
3. Effective Software Project Management, Robert K.Wysocki, Wiley,2006

CSE 411 (D) SOFTWARE TESTING METHODOLOGIES **L T P C**

3 0 0 3

Course Objectives:

- To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
- It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
- It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.

UNIT-I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II

Transaction Flow Testing: Transaction flows, transaction flow testing techniques. **Dataflow testing:** Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III

Domain Testing: Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domains and testability.

UNIT-IV

Paths, Path products and Regular expressions: Path products & Path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications.

UNIT-V

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

Text books:

1. Software Testing techniques – Boris Beizer, Dreamtech, Second Edition.
2. The craft of software testing – Brian Marick, Pearson Education.

References:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Art of Software Testing – Meyers, John Wiley.

CSM 412 (A)	PE-4: AI FOR MEDICAL ANALYSIS	L T P C
		3 0 0 3

CSM 412(B)	**PE 4: INTERNER OF ROBOTIC THINGS**	**L T P C** **3 0 0 3**

CSM 412(C) PE 4: CYBER SECURITY L T P C
3 0 0 3

Course Objectives:
The course is designed to

- **Analyze and evaluate the cyber security needs of an organization.**
- **Design and develop security architecture for an organization.**
- **Develop cyber security strategies and policies.**
- **Determine and analyze software vulnerabilities and develop necessary security solutions.**

UNIT I

Building a Secure Organization, Preventing System Intrusions, Guarding Against Network Intrusions, Internet Security, The Botnet Problem, Intranet Security, Local Area Network Security.

UNIT II

Wireless Network Security, Cellular Network Security, RFID Security, Protecting Mission Critical Systems, Security Management Systems, Information Technology Security Management, Identity Management.

UNIT III

Intrusion Prevention and Detection Systems, Computer Forensics, Network Forensics, Firewalls, Penetration Testing, Vulnerability Assessment.

UNIT IV

NET Privacy, Personal Privacy Policies, Virtual Private Networks, Identity Theft, VoIP Security, SAN Security, SAN Devices Security.

UNIT V

Risk Management, Physical Security Essentials, Biometrics, Information Warfare, Security Through Diversity, Reputation Management, Content Filtering, Data Loss Protection.

Text Books:

1. Vacca J R, Computer and Information Security Handbook, 2nd edition, Elsevier / Morgan Kaufmann, 2013.
2. Belapure S, Godbole N, Cyber Security, Wiley, 2011.

Reference Books:

1. Gogolin G, Digital Forensics Explained, CRC / Auerbach, 2013.
2. Godbole N, Information Systems Security, Wiley, 2015.
3. Wu C H, Irwin J D, Introduction to Computer Networks and Cyber Security, CRC Press, 2013.
4. Singer P W, Friedman A, Cyber Security and Cyber War: What Everyone Needs to Know, Oxford University Press, 2014.
5. Boddington R, Practical Digital Forensics, Packt, 2016.
6. Drake J J, Lanier Z, et al., Android Hacker's Handbook, Wiley, 2014.
7. Graham J, Howard R, Olson R, Cyber Security Essentials, CRC Press, 2010.
8. Hadnagy C, Wilson P, Social Engineering: The Art of Human Hacking, Wiley, 2010

CSE412 (D) PE-4 : SOFTWARE ARCHITECTURE AND PATTERN RECOGNITION

L	T	P	C
3	0	0	3

Course Objectives: This course is designed to:

- To understand interrelationships, principles and guidelines governing architecture and evolution over time.
- To understand various architectural styles of software systems.
- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

UNIT-1

Envisioning Architecture

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating and Architecture

Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT-2

Analyzing Architectures
Architecture Evaluation, Architecture design decision making, ATAM, CBAM
Moving from One System to Many
Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT-3

Patterns
Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.
Creational Patterns
Abstract factory, Builder, Factory method, Prototype, Singleton

UNIT-4

Structural Patterns

Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-5

Behavioral Patterns
Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Case Studies
A Case Study (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.

Text Books:

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: ‘Managerial Economics and Financial Analysis’, Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. ‘Managerial Economics and Financial Analysis’, Ravindra Publication.

CSM415(A) PE-5 : CRYPTOGRAPHY AND NETWORK SECURITY **L T P C**
3 0 0 3

Course Objectives:

- To understand basics of Cryptography and Network Security.
- To be able to secure a message over insecure channel by various means.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
- To understand various protocols for network security to protect against the threats in the networks.

UNIT-I

Introduction to Cryptography: Introduction to security attacks – Security services and security mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers.

UNIT-II

Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard (DES) - strength of DES - differential and linear cryptanalysis of DES - block cipher modes of operations - triple DES – AES, Blow fish, placement of encryption function.

UNIT-III

Public key cryptography and Authentication requirements: Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption. Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.

UNIT-IV

Authentication algorithms: MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service. Key Management: Key Distribution Techniques, Kerberos.

UNIT-V

Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME.

TEXT BOOKS :

1. William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI.
2. Behrouz A. Forouzan Dedeep Mukhopadhyay, "Cryptography and Network Security", McGraw Hill.

REFERENCE BOOKS:

1. Atul Kahate, "Cryptography and Network Security", McGraw-Hill.
2. C K Shymala, N Harini, Dr. T R Padmanabhan, "Cryptography and Network Security", Wiley India, 1st Edition, 2016**.**

CSM415(B) PE-5:STATISTICAL METHODS AND DATA VISUALIZATION **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To make student familiar with the python interactive environment which includes the installation of statistical packages, data structures, statistical functions, different data format conversions and various plots.
- Student will be able to perform statistical manipulations and programming in a more efficient way when compared with traditional Statistical analysis.

UNIT – I

Python and Statistics:Why Statistics? Python Packages for Statistics, First Python Programs, Pandas: Data Structures for Statistics, Data Input: Input from Text Files: Visual Inspection, Reading ASCII-Data into Python, Input from MS Excel, Data types: Categorical, Numerical.

UNIT – II

Displaying Statistical Datasets:Univariate Data: Scatter Plots, Histograms, Kernel-Density- Estimation (KDE) Plots, Cumulative Frequencies, Error-Bars, Box Plots, Grouped Bar Charts, Pie Charts.
Bivariate and Multivariate Plots: Bivariate Scatter Plots, 3D Plots

UNIT – III

Populations and Samples, Distribution Center: Mean, Median, Mode, Geometric Mean Quantifying Variability: Range, Percentiles, Standard Deviation and Variance.
Discrete Distributions-Bernoulli Distribution, Binomial Distribution, Poisson Distribution.

UNIT – IV

Normal Distribution-Examples of Normal Distributions, Central Limit Theorem
Continuous Distributions Derived from the Normal Distribution: t-Distribution, Chi-Square Distribution, F-Distribution.
Hypothesis Tests: Typical Analysis Procedure: Data Screening and Outliers, Normality Check, Hypothesis Concept, Errors, p-Value, and Sample Size-Generalization and Applications, The Interpretation of the p-Value, Types of Error, Sensitivity and Specificity.

UNIT – V

Analysis of Variance (ANOVA)-One-Way ANOVA, Two-Way ANOVA, One-Way Chi-Square Test, Chi-Square Contingency Test: Linear Regression Models-Linear Correlation-Correlation Coefficient, Rank Correlation, General Linear Regression Model, Coefficient of Determination, Linear Regression Analysis with Python.

TEXT BOOK:

1. An Introduction to Statistics with Python With Applications in the Life Sciences, Thomas Haslwanter - Springer- ISSN 1431-8784 - ISBN 978-3-319-28315-9 Springer International Publishing Switzerland 2016.

CSE 415 (C) PE-5 : DATA ANALYTICS THROUGH R L T P C
3 0 0 3

Course Objectives:

- Understand the use of R, Basics of R, Advanced data structures, reading/writing data into R.
- manipulate data using SQL statements and visualization of data using different plots.
- Understand the normal, binomial distributions, correlation and covariance, T-test, ANOVA, Manipulation string, and Linear models.
- Understand the cluster analysis and classification.

UNIT-I

Introduction to R - Why use R?, Obtaining and installing R, The R Environment - Command line interface, RStudio, R Packages - Installing packages, loading packages, Building packages.

Basics of R - basic Math, variables, Data types, vectors, calling function, function documentation, missing data. Advanced Data Structures- data Frames, Lists, Matrices, Arrays, Reading Data into R-Reading CSVs, Excel data, reading from databases.

UNIT-II

Basic Data Management - A working example, creating new variables, recoding variables, renaming variables, missing values, date values, type conversion, sorting data, merging data set, sub-setting datasets, Using SQL statement to manipulate data.

UNIT-III

Data Management Challenge - Numerical and character functions, a solution for data management challenge, control flow, User Written functions, Aggregate and reshaping, Bar plot, pie chart, Histograms, Kernel Density plots, Box plots, dot plots.

UNIT-IV

Data Distribution and Regression- Normal distribution, binomial distribution, summary statistics, correlation and covariance, T-test, ANOVA, paste, sprintf, extracting text, regular expression, Simple linear regression, multiple linear regressions, logistic regression.

UNIT-V

Cluster Analysis- Common steps in cluster analysis, calculating distances, Hierarchical cluster analysis, Partitioning cluster analysis, avoiding nonexistence clusters, Preparing the data, decision trees, random forests, support vector machines, choosing a best predictive solution.

Text books:

1. R for Every One, Advanced analytics and graphics by Jared P Lander, Addison Wisley Data and Analytics series.

2. R in Action, Data Analysis and graphics with R, Robert L Kaacoff, Manning Publisher

References:

1. Beginning R by Dr.Mark Gardener, Wrox publisher.

2. Associate Analytics Facilitator Guide provided by NASSCOM.

CSE 415 (D) **PE-5 : BIG DATA ANALYTICS** **L T P C3 0 0 3**

Course Objectives:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT-1

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-2

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-3

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

UNIT-4

Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

UNIT-5

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Text Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC

2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

3. Hadoop in Action by Chuck Lam, MANNING Publ.

4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.

2. Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne