SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(AUTONOMOUS)

Dr. Visweswaraiah Road, (Bangalore-Tirupathi Bye-pass Road), Murukambattu, Chittoor – 517127, Andhra Pradesh, India

B.Tech
Course Structures and Syllabi
Under R20 Regulations

(Applicable for 2021-2022 Regular Students & 2022-2023 Lateral Students)

Department of Computer Science and Engineering (Artificial Intelligence)

INSTITUTE VISION

To emerge as a Centre of Excellence for Learning and Research in the domains of engineering, computing and management.

INSTITUTE MISSION

- Provide congenial academic ambience with state-art of resources for learning and research.
- Ignite the students to acquire self-reliance in the latest technologies.
- Unleash and encourage the innate potential and creativity of students.
- Inculcate confidence to face and experience new challenges.
- Foster enterprising spirit among students.
- Work collaboratively with technical Institutes / Universities / Industries of National and International repute

DEPARTMENT VISION

To contribute for the society through excellence in Computer Science and Engineering (Artificial Intelligence) with a deep passion for wisdom, culture and values.

DEPARTMENT MISSION

M 1: Provide congenial academic ambience with necessary infrastructure and learning resources.
M 2: Inculcate confidence to face and experience new challenges from industry and society.
M 3: Ignite the students to acquire self-reliance in State-of-the-Art Technologies.
M 4: Foster Enterprising spirit among students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

After few years of graduation the, graduates of Computer Science and Engineering (Artificial Intelligence) shall

PEO1: Expertise with computer science and Engineering, artificial intelligence and machine learning disciplines through quality studies, enabling success in IT industries. **(Professional Competency)**

PEO2: Establish start-up companies or employed in reputed computing industries or government sectors or pursue higher studies in the domain of CSE (AI) **(Successful Career Goals)**

PEO3: Enhance knowledge by updating advanced technological concept for facing the rapidly changing world and contribute to society through innovations and creativity. **(Continuing Education and Contribution to Society)**

PROGRAMME OUTCOMES (PO's)

On Successful completion, the graduate will be able to,

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activitieswith an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leaderin diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one"s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

On Successful completion, the graduate will be able to,

PSO1: Demonstrate and analyse the mathematical methodologies to develop computer programs using networking, web design, big data analytics, machine learning algorithms, data science, neural networks and deep learning techniques.

PSO2: Deploy the artificial intelligence techniques to perform human intelligence in creating innovative products and solutions.

ACADEMIC REGULATIONS (R-20) FOR B.TECH

(Regular-Full Time)

(Effective for the students admitted into I year from the Academic Year 2021-2022 and IIyear lateral entry from the Academic year 2022-2023 onwards)

Curriculum for Regular and Honors/Minors B.Tech Program of all Branches

1. Eligibility for Admission

1.1 Admission of the B.Tech program shall be made subjects to the eligibility qualifications and Specialization prescribed by the University for each Programfrom time to time and also as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

1.2 Admission shall be made either on the basis of Merit / Rank Obtained by the Qualifying candidates in EAMCET/ECET or otherwise specified whichever is relevant.

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. For regular entry students, shall pursues a course of study in not less than four and not more than eight academic years.

ii. For lateral entry students, shall pursue a course of study for not less than three academic years and in not more than six academic years.

iii. For regular entry students, 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.

iv. For lateral entry students, after six academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.

v. For regular entry students shall register for 163 credits and must secure all the 160 credits. For lateral entry students shall register for 124 credits and secure all 124 credits

vi. 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 163 credits for Regular entry students /124 credits for lateral entry students.

vii. 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:

All subjects / courses offered for the under graduate program in B.Tech. Degree programs are broadly classified as follows.

S.No	Course Classification	Course Category	Course Code
1	Foundation Courses	Humanities and Social Science including Management Courses	HSM
		Basic Science Courses	BSC
		Engineering Science Courses	ESC
2	Core Courses	Professional Core Courses	PCC
3	Elective Courses	Professional Elective Courses	PEC
		Open Elective Courses	OEC
4	Employability Enhancement Courses	Internship, Seminar and Project Work	PROJ
		Skill Oriented Courses / Skill Advanced Courses	SOC/SAC
5	Audit Courses	Mandatory Audit Courses	MAC
6	Minor / Honor Courses	Minor Courses / Honor Courses	MR/HR

4. Assigning of Credits:

i. 1 Hr. Lecture (L) per week – 1 Credit

ii. 1 Hr. Tutorial (T) per week – 1 Credit

iii. 1 Hr. Practical (P) per week – 0.5 Credits

iv. 2 Hours Practical (Lab) per week – 1 Credit

5. Induction Program for I. B.Tech Program

i. There shall be mandatory student induction program for fresher"s, with a three-week duration before the commencement of first semester.

ii. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Department / Branch and Innovations etc., shall be included in the guidelines issued by AICTE.

6. Assessment

i. 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 and project work.

ii. The audit courses shall be evaluated for a maximum of 30 internal marks.

iii. For theory and practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Semester Examinations.

iv. 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 Examination and End Semester Examinations marks to earn the credits allotted to each course.

6.1 Internal Examination

6.1.1 For theory subjects, during the semester, there shall be two Mid-Term Examinations will be conducted.

6.1.2 Each Mid-Term Examination consists of objective paper for 10 marks and subjective paper for 15 marks with the duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

6.1.3 The subjective paper shall contain 3 either-or type questions with equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark.

6.1.4 If the student is absent for the any internal examination, no re-exam or make up exam shall be conducted and marks for that examination shall be considered as zero.

6.1.5 First Mid-Term Examination shall be conducted for I & II units of syllabus and second Mid-Term Examinations shall be conducted for III, IV & V units.

6.1.6 However 5 marks are awarded for 5 Assignments (unit-wise).

6.1.7 Final Internal marks shall be arrived at by considering the marks secured by the student in both the Mid-Term examinations with 80% weightage to the better mid exam and 20% to the other

For Example:

- Marks obtained in First Mid-Term: 25
- Marks obtained in Second Mid-Term: 25
- Internal Marks: (25x0.8) + (25x0.2) = 25
- Final internal marks = Internal Marks + Assignment marks

6.1.8 If the student is absent for any one Mid-Term Examinations, the final internal marks shall be arrived at by considering 80% Weightage to the marks securedby the student in the appeared examination and zero to the other.

For Example:

- Marks obtained in First Mid-Term: Absent
- Marks obtained in Second Mid-Term: 25
- Internal Marks: (25x0.8) + (0x0.2) = 20
- Final internal marks = Internal Marks + Assignment marks

6.1.9 For practical courses there shall be 30 internal marks. 15 marks allotted for Internal Practical Examination to be conducted before the last working day and 15 marks for Day-to-Day work in the laboratory shall be evaluated by the concerned

laboratory teacher based on the regularity / record / viva-voce.

6.1.10 In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.1.11 The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

6.2 Semester End Examination

6.2.1 End examination of theory courses shall have the following pattern:

i. There shall be two parts, Part-A and Part-B.

ii. Part-A shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.

iii. Part-B Shall be either-or type questions of 10 marks each. Student shall answer any one of it.

iv. Each of these questions from Part-B shall cover each unit of the syllabus.

6.2.2 End examination of practical courses shall have the following pattern:

i. End Semester Examination shall be for 70 marks.

ii. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

iii. In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), the End Semester Examination shall be conducted for 35 marks in each part.

iv. The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

6.3 Drawing Courses

6.3.1 For the subject having design and/or drawing, such as Engineering Drawing / Graphics.

6.3.2 The distribution shall be 30 marks for internal evaluation (15 marks for Day- to-Day work (unit wise chart work / Assignment) and for another 15 marks there shall be a two MID Term exams will be conducted) and 70 marks for semester end examinations.

6.3.3 There shall be two Mid-Term examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other.

6.3.4 The internal subjective paper shall contain 3 either-or type questions with equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark and there shall be no objective paper in internal examination.

6.3.5 The sum of Day-to-Day work evaluation / assignments and the internal MID Term test marks will be the final internal marks for the course.

6.3.6 In the end examination pattern for Engineering Drawing / Graphics there shall be 5 questions, either-or type, of 14 marks each.

6.4 Mandatory Audit Courses

6.4.1 Courses like Human Values and Ethics, Environmental Sciences, Constitution of India and Design Thinking for Innovation shall be included in the curriculum as non-credit mandatory audit courses.

6.4.2 However, attendance in the audit courses shall be considered while calculating aggregate attendance. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course.

6.4.3 The Internal Marks will be calculated similar to that of Theory course.

6.4.4 In grade sheet the completion of the course indicated as Pass – "P", and No marks or letter grade shall be allotted, for all non-credit mandatory audit courses.

6.4.5 Re-exam shall be conducted for failed candidates for every semester at a mutual convenient date of institution.

6.5 Professional Elective Courses

6.5.1 Students have to choose Professional Elective Courses PEC-I in V semester, PEC-II in VI semester and PEC-III, PEC-IV, PEC-V in VII semester, from the list of elective courses given.

6.5.2 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Professional Elective Courses.

6.5.3 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

6.5.4 The assessments of Professional Elective Courses are same as regular theory courses.

6.6 Open Elective Courses

6.6.1 A student shall opt for any 4 courses from the list given by the institute from time to time, complying with the requirement of the prerequisite course(s), if any.

6.6.2 Students have to choose Open Elective Courses OEC-I in V semester, OEC-II in VI semester and OEC-III, OEC-IV in VII semester, from the list of elective courses given.

6.6.3 All Open Elective Courses are offered to the students of across all branches in general.

6.6.4 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Open Elective Courses.

6.6.5 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 their Program.

6.6.6 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

6.7 Massive Online Open Courses

6.7.1 MOOC courses under Professional Elective / Open Elective

6.7.2 A student shall be permitted to pursue up to a maximum of two elective courses (Professional Elective Courses or Open Elective Courses) under MOOCs during the Program. Each of the courses must be of minimum 12 weeks in duration for 3 credits. Attendance will not be monitored for MOOC courses.

6.7.3 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.

6.8 Mandatory Internships

6.8.1 Students shall undergo two mandatory summer internships for a minimum of four weeks duration at the end of second and third year of the Program.

6.8.2 The internship can be done by the students at Local Industries, Government Organizations, Public Sector Companies, Research Laboratories, Construction agencies, Power Plants and also in software MNCs.

6.8.3 A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the Department Evaluation Committee nominated by the Principal at the end of the semester for the evaluation of summer internship.

6.8.4 The performance of a student in each mandatory summer internships shall be evaluated with a maximum of 100 marks.

6.8.5 The report and the oral presentation shall carry 40% and 60% weightage respectively.

6.9 Project work and Internships

6.9.1 In the final semester, the student should undergo Internship / Project Work with well-defined objectives.

6.9.2 Students Project Batch will have maximum of four students comprising the fast and slow learners.

6.9.3 Every student shall be required to undertake a Project Work in the Institution / Internship cum Project Work in Local Industries / Government Organizations / Public Sector Companies / Research Laboratories / Construction agencies / Power Plants and also in software MNCs in consultation with Head of the Department and Department Project Evaluation Committee.

6.9.4 The Department project evaluation committee continuously monitors and evaluates the progress of the Project Work / Internship cum Project Work by conducting three reviews including abstract review during the project period.

6.9.5 During the project review meetings, batch presentation and individual contributions are monitored to assess individual student performance and also team performance.

6.9.6 The evaluation of the project is done based on the rubrics designed for that curriculum component.

6.9.7 At the end of the semester the candidate shall submit an Internship cum Project completion certificate along with project report on the work carried out during the project work at the industry.

6.9.8 A student shall be permitted to submit project report on the work carried out during the project work at the institution/department.

6.9.9 The project work submitted to the department shall be evaluated for 100 marks, out of which 30 marks are for internal evaluation and 70 marks for external viva-voce.

6.9.10 The internal evaluation shall be made by the Department Project Evaluation Committee, on the basis of three reviews given by each students / batch on the topic of his/her project.

6.9.11 The final viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the Semester.

6.9.12 In case a student fails in viva voce he /she shall reappear as and when supplementary examinations are conducted.

6.9.13 The distribution of marks for the Internal assessment and End Semester Examination is given below:

Internal Assessment (30 Marks)			**End Semester Examination (70 Marks)**		
Review - I	Review - II	Review - III	Supervisor	Internal Examiner	External Examiner
10	10	10	20	25	25

6.10 Eligibility to appear for Semester End Examinations

6.10.1 A student shall be eligible to appear for Semester End Examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

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

6.10.3 Students whose shortage of attendance is not condoned in any semester are not eligible to take their Semester End Examination of that class and their registration shall stand cancelled.

6.10.4 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.

6.10.5 A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

6.11 Issue of Photocopy of Answer Script

6.11.1 A student can request for the photo copy of answer script of any theory examination within one week after the declaring the results by paying fee.

6.11.2 The examination section shall issue a notification inviting applications for the issue of photocopy of answer script after publishing the results.

6.11.3 The application forms can be obtained from the examination section.

6.12 Revaluation

6.12.1 A candidate can apply for revaluation of his / her end examination answer paper in a theory courses.

6.12.2 The examination section shall issue a notification inviting applications for the revaluation after publishing the results.

6.12.3 The application forms can be obtained from the examination section.

6.12.4 A candidate can apply for revaluation of answer scripts in not more than 5 courses at a time.

6.12.5 No revaluation for practical courses, comprehensive viva-voce / Examination and project work.

6.13 Challenge Valuation

6.13.1 A student can apply for challenge valuation by prescribed fee.

6.13.2 Challenging valuation shall be carried out by an external subject expert.

6.13.3 The challenging valuation should be done strictly as per the scheme of valuation supplied by the examination section in the presence of Principal.

6.13.4 The examination section shall issue a notification inviting applications for the challenging valuation after publishing the revaluation results.

6.13.5 The application forms can be obtained from the examination section.

7. Promotion Rules

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

7.2 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 IV Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year IV semester.

i. **One** regular and **three** supplementary examinations of I B.Tech I Semester.

ii. **One** regular and **two** supplementary examinations of I B.Tech II Semester.

iii. **One** regular and **one** supplementary examinations of II B.Tech III Semester.

iv. **One** regular examination of II B.Tech IV semester.

7.3 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 6th semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year 6th semester.

i. **One** regular and **five** supplementary examinations of I B.Tech I Semester.

ii. **One** regular and **four** supplementary examinations of I B.Tech II Semester.

iii. **One** regular and **three** supplementary examinations of II B.Tech III Semester.

iv. **One** regular and **two** supplementary examinations of II B.Tech IV Semester.

v. **One** regular and **one** supplementary examinations of III B.Tech V Semester.

vi. **One** regular examination of III B.Tech VI Semester.

7.4 For Lateral entry student promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year VI semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year VI semester.

i. One regular and three supplementary examinations of II B.Tech III Semester.

ii. One regular and two supplementary examinations of II B.Tech IV Semester.

iii. One regular and one supplementary examinations of III B.Tech V Semester.

iv. One regular examination of III B.Tech VI Semester.

8. Extra Curricular Activities

i. Students shall enroll, on admission, in any one of the personality and character development programs (NSS/YRC etc.,) and undergo training and attend a camp.

ii. The training shall include classes on hygiene and health awareness and also training in first-aid.

iii. National Service Scheme (NSS) and Youth Red Cross (YRC) will have social service activities in and around the Institution.

iv. A student will be required to participate in an activity for an hour in a week during their second and third years.

9. Skill Oriented / Skill Advanced Courses

i. There shall be 05 Mandatory Skill-Oriented Courses offered during III to VII semesters.

ii. The list of such courses shall be included in the curriculum structure of each branch of Engineering.

10. Curricular Framework for Honors Program

i. Under Graduate degree with Honors shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors program.

ii. Students of a Department are eligible to opt for Honors Program offered by the same Department / Discipline, subject to a maximum of two additional courses per semester.

iii. A student shall be permitted to register for Honors program at the beginning of IV semester provided that the student must have acquired a minimum average of 8.0 SGPA upto the end of II semester without any backlogs. In case of the declaration of the III semester results after the commencement of the IV semester and if a student fails to score the required minimum of 8.0 SGPA, his/her registration for Honors Program stands cancelled and he/she shall continue with theregular Program.

iv. 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. In addition to fulfilling all the requisites of a Regular B.Tech . Program, 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. 160/121 credits).

v. Of the 20 additional Credits to be acquired, and 16 credits (four courses) shall be earned by undergoing specified courses listed as pools (two courses per pool either theory course or theory with lab component), and each carrying 4 credits. The remaining 4 credits (two courses) 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.

vi. The courses offered in each pool (two courses per pool) shall be domain specific courses and advanced courses.

vii. 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 academic council.

viii. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course.

ix. 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.

x. The concerned BoS shall also consider courses listed under professional Elective Courses 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 Program.

xi. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open 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 Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.

xii. 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 studentseligible 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.

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

11. Curricular Framework for Minor Program

i. Under graduate Degree with Minor Program shall be issued by the Institutionto the students who fulfill all the academic eligibility requirements for the B.Tech program and Minor Program.

ii. 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 Computer Science Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with minor degree of Computer Science Engineering. 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.

iii. The concerned BOS 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, Virtual Realty, VLSI etc.

iv. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

v. 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.

vi. A student shall be permitted to register for Minors program at the beginning of IV semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8.0 SGPA (Semester Grade point average) upto the end of II semester without any history of backlogs. It is expected that the III semester results may be announced after the commencement of the IV semester. If a student fails to acquire 8.0 SGPA upto III semesters or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

vii. 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. 160/121 credits).

viii. Of the 20 additional Credits to be acquired and 16 credits shall be earned by undergoing specified courses listed in course structure and 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.

ix. 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 BoS.

x. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.

xi. If a student drops or terminated from the Minor program, they cannot convert the earned credits into open 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.

xii. 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.

xiii. 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.

12. Grading

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

Marks Range	Level	Letter Grade	Grade Point
≥ 90	Outstanding	S	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

13. Calculation of Semester Grade Point Average (SGPA) and Cumulative GradePoint 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.

$$SGPA = \frac{\sum(C_i \, X \, G_i)}{\sum C_i}$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point 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.

$$CGPA = \frac{\sum(C_j \, X \, S_j)}{\sum_j C}$$

where „S_j" is the SGPA of the j[th] semester and C_j 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 S, A, B, C, D, E and F.

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

viii. Equivalent Percentage = (CGPA – 0.50) x 10.

14. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and are 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

15. With-Holding the Result

If the candidate has any dues not paid to the institution or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

16. Transitory Regulations and Gap – Year

i. Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for attendance shortage or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for

ii. admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered and they will be in the academic regulations into which they get readmitted.

iii. 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.

iv. An evaluation committee at university 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.

v. Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work and they will be in the academic regulations into which the candidate is presently rejoining.

17. Industrial Collaborations

i. Institution-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.

ii. The Departments are permitted to design any number of Industry oriented minor tracks as the respective BoS feels necessary. In this process the departments can plan to have industrial collaborations in designing the minor tracks and to developthe content and certificate programs.

18. Community Service Project

i. Community Service Project should be an integral part of the curriculum, as an alternative to the Internships, whenever there is an exigency when students cannot pursue their internships.

ii. Every student should put in a minimum of 144 hours for the Community Service Project during the summer vacation. Each class/section should be assigned with a mentor.

iii. 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

iv. 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 in-charge.

v. 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 programs 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.

vi. 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.

vii. 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.

viii. Secondly, the student/s could take up a social activity, concerning their domain orsubject 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 etc.,

19. Transfer Details

i. Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

20. Preservation of Records

i. The laboratory records, internal test papers and end examination answer booklets shall be preserved for minimum of 2 years from the date of completion of their degree in the institution.

21. Amendments to Regulations

The Academic Council of SITAMS (Autonomous) reserves the right to revise, amend or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

22. General

i. The academic regulations should be read as a whole for purpose of any interpretation. Malpractices rules- nature and punishments are appended.

ii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

23. Conduct and Discipline

i. Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National importance.

ii. As per the order of the Hon"ble Supreme Court of India, ragging in any form is banned: acts of ragging will be considered as gross indiscipline and will be severely dealt with.

iii. The following additional acts of omission and /or commission by the students within or outside the precincts of the college shall constitute gross violation of code of conduct and are liable to invoke disciplinary measures

a. Ragging
b. Lack of courtesy and decorum: indecent behaviour anywhere within or outside the campus.
c. Willful damages or stealthy removal of any property /belongings of the Institute / Hostel or of fellow students
d. Possession, consumption of distribution of alcoholic drinks or any kind of hallucinogenic drugs
e. Mutilation or unauthorized possession of library books
f. Hacking in computer systems
g. Furnishing false statements to the disciplinary committee, or willfully withholding information relevant to an enquiry
h. Organizing or participation in any activity that has potential for driving fellow students along lines of religion caste batch of admission hostel or any other unhealthy criterion.
i. Resorting to noisy and unseemly behavior, disturbing studies of students.
j. Physical or mental harassment of fresher through physical contact or oral abuse
k. Adoption of unfair means in the examination
l. Organizing or participating in any group activity except purely academic and scientific Programmers in company with others in or outside campus without prior permission of the Principal
m. Disturbing in drunken state or otherwise an incident in academic or students function or any other public event.

n. Not obeying traffic rules in campus not following safety practices or causing potential danger to oneself or other persons in any way.
o. Any other act or gross indiscipline

iv. Commensurate with the gravity of the offence the punishment may be reprimand fine and expulsion from the hostel debarment from an examination rustication for a specified period or even outright expulsion from the College.

v. The reprimanding Authority for an offence committed by students in the Hostel and in the Department or the classroom shall be respectively, the managers ofthe Hostels and the Head of the concerned Department

vi. In all the cases of offence committed by students in jurisdictions outside the purview the Principal shall be the Authority to reprimand them.

vii. All Major acts of indiscipline involving punishment other than mere reprimand shall be considered and decided by the Principal Students Disciplinary Committee appointed by the Principal.

viii. All other cases of Indiscipline of Students like adoption of unfair means in the examinations shall be reported to the Vice-Principal for taking appropriate action and deciding on the punishment to be levied.

ix. In all the cases of punishment levied on the students for any offence committed the aggrieved party shall have the right to appeal to the Principal who shall constitute appropriate Committees to review the case.

NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT	PUNISHMENT
1. (a) possesses or keeps access in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory/ practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) Expulsion from the examination hall and cancellation of the performance in that subject only.	Expulsion from the examination Hall and cancellation of the performance in that subject Only.
1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or	Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved

communicates through cell phones with any candidate or persons inside or outside the exam hall in respect of any matter. Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.	in case of an outsider He / She will be handed over to the police and a case is registered against him/her.
2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examinations hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and projects work and shall not be permitted to appear for the reaming examinations of the subjects of that semester/Year. The Hall Ticket of the candidate will be cancelled and retained by the CE.
3. Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical"s and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the	If the imposter is an outsider, he/she will be handed over to the police and a case is

question paper or answer book or additional sheet, during or after the examination.	registered against him/her. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidates subject to the academic regulations in connection with forfeiture of seat.
5. Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6. Refuses to obey the orders of the Chief – Superintendent/ Assistant- Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall or causes any injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in-charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7. Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including Practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all the external examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8. Possesses any lethal weapon or Fire arm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9. Belongs to college, who is not a candidate for the particular examination or any person not connected with the college but indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a Police case will be registered against them.

10. Comes in a drunken state to the examination hall.	Expulsion from the examination hall and cancellation of the performance.
11. Copying is detected on the basis of internal evidence, such as, during valuation or during special scrutiny	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester / year examinations.
12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note: Failing to read the regulation is not considered as an excuse

B.Tech R20 - COURSE STRUCTURE AND SYLLABI

Semester I (First Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC111	Algebra and Calculus	2	1	0	3	30	70	100
2	20BSC112	Applied Chemistry	3	0	0	3	30	70	100
3	20BSC113	Applied Physics	3	0	0	3	30	70	100
4	20ESC111	Engineering Graphics	1	0	4	3	30	70	100
5	20CSE111	C and Data Structures	2	1	0	3	30	70	100
6	20BSC114	Engineering Chemistry Lab	0	0	2	1	30	70	100
7	20BSC115	Engineering Physics Lab	0	0	2	1	30	70	100
8	20CSE112	C and Data Structures Lab	0	0	3	1.5	30	70	100
9	20ESC112	Engineering Workshop & IT Workshop	0	0	2	1	30	70	100
Contact hours per week			11	2	13	-	-	-	-
Total hours per week			26						
Total credits (5 Theory + 3 Labs)						19.5	-	-	-
Total Marks							270	630	900

Semester II (First Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM111	Communicative English for Engineers	3	0	0	3	30	70	100
2	20BSC121	Differential Equations and Transform Techniques	2	1	0	3	30	70	100
3	20ECE111	Electronics Devices and Circuits	2	1	0	3	30	70	100
4	20ESC113	Basic Electrical Engineering	2	1	0	3	30	70	100
5	20ESC115	Programming with Python	2	1	0	3	30	70	100
6	20HSM112	Communicative English Language Lab	0	0	3	1.5	30	70	100
7	20ESC117	Fundamentals of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
8	20ESC118	Programming with Python Lab	0	0	3	1.5	30	70	100
Contact hours per week			11	4	9	-	-	-	-
Total hours per week			24					-	-
Total credits (5 Theory + 4 Labs)						19.5			
Total Marks							240	560	800

Semester III (Second Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC233	Mathematical Foundations of Computer Science	2	1	0	3	30	70	100
2	20ESC237	Digital Logic Design and Microprocessor	2	1	0	3	30	70	100
3	20CSM231	Advanced Data Structures and Algorithms	3	0	0	3	30	70	100
4	20CSE231	Computer Organization and Architecture	3	0	0	3	30	70	100
5	20CSE233	Programming with JAVA	2	1	0	3	30	70	100
6	20CSM232	Web Programming	0	1	2	2	30	70	100
7	20ESC238	Digital Logic Design and Microprocessor Lab	0	0	3	1.5	30	70	100
8	20CSM233	Advanced Data Structures and Algorithms Lab	0	0	3	1.5	30	70	100
9	20CSE236	Programming with JAVA Lab	0	0	3	1.5	30	70	100
Contact Hours per week			12	4	11	-	-	-	-
Total Hours per week			27			-	-	-	-
Total credits						21.5	-	-	-
Total Marks							270	630	900

Semester IV (Second Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC231	Numerical Methods and Probability Theory	3	1	0	4	30	70	100
2	20HSM241	Principles of Management	3	0	0	3	30	70	100
3	20CSM241	Artificial Intelligence: Principles and Techniques	3	0	0	3	30	70	100
4	20CSE241	Database Management Systems	3	0	0	3	30	70	100
5	20CSE242	Operating Systems	3	0	0	3	30	70	100
6	20CSE244	Data Analytics using R	0	1	2	2	30	70	100
7	20CSM242	Artificial Intelligence: Principles and Techniques Lab	0	0	3	1.5	30	70	100
8	20CSE245	Database Management Systems Lab	0	0	3	1.5	30	70	100
9	20CSE246	Operating Systems Lab	0	0	3	1.5	30	70	100
10	20MAC231	Environmental Sciences	2	0	0	0	P		-
11		Internship during summer vacation	-	-	-	-	-	-	-
Contact Hours per week			17	2	11	-	-	-	-
Total Hours per week			30			-	-	-	-
Total credits						22.5	-	-	-
Total Marks							270	630	900
1		**Honors / Minor Courses***	3	1	0	4	30	70	100

Semester V (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CSM351	Machine Learning Techniques	2	1	0	3	30	70	100
2	20CSE243	Software Engineering And Design	2	1	0	3	30	70	100
3	20CAI351	AI for Image Analysis	3	0	0	3	30	70	100
4	20CAI352	Professional Elective Course – 1	3	0	0	3	30	70	100
5	OE-I	Open Elective Course – 1	3	0	0	3	30	70	100
6	20CAI353	Advanced Web based Programming	0	1	2	2	30	70	100
7	20CSM353	Machine Learning Techniques Lab	0	0	3	1.5	30	70	100
8	20CSE247	Software Engineering And Case Tools Lab	0	0	3	1.5	30	70	100
9	20MAC351	Constitution of India	2	0	0	0	P	-	-
10	20CAI357	Industry Internship / Community Service Project – Evaluation	0	0	0	1.5	-	-	100
Contact Hours per week			15	3	8	-	-	-	-
Total Hours per week			26			-	-	-	-
Total credits						21.5	-	-	-
Total Marks							240	560	900
1		**Honors / Minor Courses***	3	1	0	4	30	70	100

Semester VI (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CSM361	Neural Network and Deep Learning	2	1	0	3	30	70	100
2	20CAI361	Principles of Robotics	2	1	0	3	30	70	100
3	20CSE363	Computer Networks	2	1	0	3	30	70	100
4	20CAI362	Professional Elective Course – 2	3	0	0	3	30	70	100
5	OE-II	Open Elective Course – 2	3	0	0	3	30	70	100
6	20HSM231	Soft Skills	0	1	2	2	30	70	100
7	20CSM362	Neural networks and Deep learning lab	0	0	3	1.5	30	70	100
8	20CSE366	Network Simulator Lab	0	0	3	1.5	30	70	100
9	20CAI363	Project Skills Lab	0	0	3	1.5	30	70	100
10	20MAC352	Design Thinking for Innovation	2	0	0	-	P	-	-
11	20CAI363	Industrial / Research Internship during Summer Vacation	-	-	-	-	-	-	-
Contact Hours per week			14	4	11	-	-	-	-
Total Hours per week			29			-	-	-	-
Total credits						21.5	-	-	-
Total Marks							270	630	900
1		**Honors / Minor Courses***	3	1	0	4	30	70	100

Semester VII(Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM471	Humanities and Social Science Elective	3	0	0	3	30	70	100
2	20HSM472	Universal Human Values and Ethics	3	0	0	3	30	70	100
3	20CAI471	Professional Elective Course – 3	3	0	0	3	30	70	100
4	20CAI472	Professional Elective Course – 4	3	0	0	3	30	70	100
5	20CAI473	Professional Elective Course – 5	3	0	0	3	30	70	100
6	OE-III	Open Elective Course – 3	3	0	0	3	30	70	100
7	OE-IV	Open Elective Course – 4	3	0	0	3	30	70	100
8	20CSE474	Mobile Application Development (SAC)	0	1	2	2	30	70	100
9	20CAI474	Industry Internship / Community Service Project – Evaluation	0	0	0	2	-	-	100
Contact Hours per week			21	1	2	-	-	-	-
Total Hours per week			24			-	-	-	-
Total credits						25	-	-	-
Total Marks							240	560	900
1		**Honors / Minor Courses***	3	1	0	4	30	70	100

Semester VIII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI481	Project Work	0	0	0	12	30	70	100
Contact Hours per week			0	0	0	12	-	-	-
Total Hours per week			-			-	-	-	-
Total credits						12	-	-	-
Total Marks							30	70	100

- ***Eligible and interested students can register either for Honors or for a Minor in IVSemester onwards, as per the regulation guidelines.***

Professional Elective Course – 1 (Semester V)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI352A	Fundamental of Automata and Compiler Design	3	-	-	3	30	70	100
2	20CAI352B	Distributed Database and Information System	3	-	-	3	30	70	100
3	20CAI352C	Data Visualization Techniques	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 2 (Semester VI)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI362A	AI and Gaming Application	3	-	-	3	30	70	100
2	20CAI362B	Computer Graphics and Multimedia Technology	3	-	-	3	30	70	100
3	20CAI362C	Bio Inspired Computing	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 3 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI471A	AI: Knowledge Representations And Reasoning	3	-	-	3	30	70	100
2	20CAI471B	Information Security Management	3	-	-	3	30	70	100
3	20CAI471C	Machine Learning For Data Science	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 4 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI472A	Artificial Intelligence For Cyber Security	3	-	-	3	30	70	100
2	20CAI472B	Computer Vision in Healthcare Application	3	-	-	3	30	70	100
3	20CAI472C	Statistical Natural Language Processing	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 5 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20CAI473A	AI in Speech processing	3	-	-	3	30	70	100
2	20CAI473B	Smart Sensing Structures and AI	3	-	-	3	30	70	100
3	20CAI473C	Fundamentals of Internet of Things	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Open Elective Course – 1 (Semester V)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OHSM351	Graph Theory with Applications	S&H	3	-	-	3	30	70	100
2	20OCIV351	Air Pollution and Control	CIV	3	-	-	3	30	70	100
3	20OEEE351	Renewable Energy Sources	EEE	3	-	-	3	30	70	100
4	20OMEC351	Industrial Robotics	MEC	3	-	-	3	30	70	100
5	20OECE351	Automotive Electronics	ECE	3	-	-	3	30	70	100

Open Elective Course – 2 (Semester VI)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OHSM361	Laser and Fiber Optics	S&H	3	-	-	3	30	70	100
2	20OCIV361	Building Technology	CIV	3	-	-	3	30	70	100
3	20OEEE361	Power Plant Engineering	EEE	3	-	-	3	30	70	100
4	20OMEC361	3D Printing Concepts	MEC	3	-	-	3	30	70	100
5	20OECE361	Communication Networks	ECE	3	-	-	3	30	70	100

Open Elective Course – 3 (Semester VII)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OHSM471	Nano Science and Technology	S&H	3	-	-	3	30	70	100
2	20OCIV471	Disaster Mitigation and Management	CIV	3	-	-	3	30	70	100
3	20OEEE471	PLC and Applications	EEE	3	-	-	3	30	70	100
4	20OMEC471	Product Design and Innovation	MEC	3	-	-	3	30	70	100
5	20OECE471	Medical Electronics	ECE	3	-	-	3	30	70	100

Open Elective Course – 4 (Semester VII)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OHSM472	Total Quality Management	S&H	3	-	-	3	30	70	100
2	20OCIV472	Industrial Waste Treatment and Disposal	CIV	3	-	-	3	30	70	100
3	20OEEE472	Electric Vehicle Technology	EEE	3	-	-	3	30	70	100
4	20OMEC472	Solar Energy Technology	MEC	3	-	-	3	30	70	100
5	20OECE472	Pattern Recognition	ECE	3	-	-	3	30	70	100

20HSM471 - Humanities and Social Science Elective Course (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P/D	C	I	E	Total
1	20HSM471A	Industrial Engineering and Psychology	3	-	-	3	30	70	100
2	20HSM471B	Intellectual Property Rights and Patents	3	-	-	3	30	70	100
3	20HSM471C	Managing Innovation and Entrepreneurship	3	-	-	3	30	70	100

Mandatory Audit Course – Vth Semester (EEE, ECE, CSE-AI & CSE-DS)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P/D	C	I	E	Total
1	20MAC351	Constitution of India	2	-	-	-	-	-	-

Mandatory Audit Course – Vth Semester (Civil, CSE, Mechanical & AIML)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P/D	C	I	E	Total
1	20MAC352	Design Thinking for Innovation	2	-	-	-	-	-	-

Mandatory Audit Course – VIth Semester (Civil, CSE, Mechanical & AIML)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P/D	C	I	E	Total
1	20MAC351	Constitution of India	2	-	-	-	-	-	-

Mandatory Audit Course – VIth Semester (EEE, ECE, CSE-AI & CSE-DS)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P/D	C	I	E	Total
1	20MAC352	Design Thinking for Innovation	2	-	-	-	-	-	-

I B.Tech – I Semester

		L	T	P	C
20BSC111	**ALGEBRA AND CALCULUS (Common to All Branches)**	**2**	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To familiarize the students with the theory of matrices.
2. To explain the series expansion using means value theorem and basic concepts of partial derivatives and its applications
3. To learn the methods of evaluation of double and triple integrals
4. To explain the concept of vector differentiation
5. To explain the concept of vector integration

UNIT 1: **MATRICES** **(9)**

Rank - Echelon form and Normal form - Solution of linear system of homogeneous and non-homogeneous equations - Direct method: Gauss elimination method - Eigen values and Eigen vectors of a matrix and properties (without proofs) - Cayley-Hamilton theorem (without proof): Inverse and powers of a matrix. – Diagonalization of a matrix using similarity transformation only.

UNIT – 2: DIFFERENTIAL CALCULUS AND ITS APPLICATIONS **(9)**

Rolle"s Theorem, Lagrange"s Theorem(without proof) - Taylor"s and Maclaurin"s series for single variable (simple examples) - Functions of several variables - Jacobian – Taylor"s and Maclaurin"s series for two variables - Maxima and minima of functions of two variables - Lagrangian method of undetermined multipliers with three variables only.

UNIT -3: MULTIPLE INTEGRALS **(9)**

Double and triple integrals: Evaluation of Double integrals (Cartesian and polar coordinates), Change of order of integration (Cartesian form only), Change of variables: double integration from Cartesian to polar coordinates, Evaluation of Triple integrals (Cartesian coordinates).

UNIT -4: VECTOR DIFFERENTIAL CALCULUS **(9)**

Introduction to Vector Differentiation, Scalar and Vector point functions - Gradient of a Scalar function, directional derivative, Divergence of a Vector function, Solenoidal vector, Curl of a Vector function, Irrotational vector, Laplacian operator.

UNIT -5: VECTOR INTEGRAL CALCULUS **(9)**

Line Integral - Potential function - Surface and volume integrals - Green"s, Stoke"s and Gauss divergence theorem (without proofs) - Verification of Green"s, Stoke"s and Gauss divergence theorems.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	To solve system of homogenous and non-homogenous linear equations, find the Eigen values and Eigen vectors of a matrix and identify special properties of a matrix.	**PO1,PO2,PO3**
CO2	Illustrate series expansion of functions using mean value theorems, Interpret partial derivatives as a function of several variables, Apply Jacobean concept to deal with the problems in change of variables, Evaluate maxima and minima of functions.	**PO1,PO2,PO3**
CO3	To evaluate double and triple integrals of functions of sever al variables	**PO1,PO2,PO3**
CO4	To illustrate the physical interpretation of gradient, divergence and curl and apply operator del to scalar and vector point functions.	**PO1,PO2,PO3**
CO5	To find line, surface, volume integrals and the work done in moving a particle along the path over a force field and apply Green"s, Gauss divergence and Stokes theorem in evaluation of line, surface and volume integrals.	**PO1,PO2,PO3**

TEXT BOOKS:

1. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, "Engineering Mathematics–I", S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad ."Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewa,"Higher Engineering Mathematics", Khanna Publishers, Delhi, , 44/e, 2017

REFERENCE BOOKS:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. N.P.Bali ,"A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, Delhi.
3. Dr. M. K. Venkata Ramana ,"Higher Engineering Mathematics", National Pub, Madras
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-I", Pearson Educations, Chennai.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/110/105/111105111/
2. https://www.youtube.com/watch?v=8D3WViAyJvc
3. https://www.youtube.com/watch?v=fKzDtjq0ks4
4. https://www.youtube.com/watch?v=wMd4YRyBmjA
5. https://www.youtube.com/watch?v=ArkDa6d5h9I
6. https://www.youtube.com/watch?v=KgItZSst2sU
7. https://www.youtube.com/watch?v=-I3HUeHi1Ys
8. https://www.youtube.com/watch?v=SZCsFS9izfQ
9. https://www.youtube.com/watch?v=ma1QmE1SH3I

CO-PO MAPPING:

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

20BSC112	APPLIED CHEMISTRY (Common to ECE, EEE, CSE, CSM, CAI & CSD)	L 3	T 0	P 0	C 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To learn different purification methods and analyse the impurities present in water.
2. To develop skill to describe the mechanism and control of corrosion.
3. To train the students on the fundamentals and applications of polymers.
4. To understand and apply the concepts of electrochemistry effectively.
5. To introduce basic principles of spectroscopy and chromatography

UNIT -1: WATER AND WATER FOR INDUSTRIAL PURPOSE (9)

Water: Sources of water - Types of Impurities in Water - Hardness of water - Temporary and permanent hardness - Estimation of hardness by EDTA Method and numerical problems - Analysis of water - Dissolved oxygen - Disadvantages of hard water - Methods of treatment of water for domestic purpose - Sterilization - Chlorination , Ozonisation.

Water for industrial purpose: Water for steam making - Boiler troubles - Priming and foaming , Boiler corrosion , Scales and sludge ,Caustic embrittlement - Water treatment - Internal treatment - Colloidal , Phosphate ,Calgon , Carbonate and Sodium aluminate conditioning of water - External treatment - Ion - exchange process - Demineralization of brackish water – Reverse osmosis.

UNIT - 2: SCIENCE OF CORROSION (9)

Definition - Types of corrosion - Dry corrosion(Direct chemical attack) - Wet corrosion - Theories of corrosion and mechanism - Electro chemical theory of corrosion - Galvanic corrosion - Concentration cell corrosion - Oxygen absorption type - Factors influencing the corrosion - Control of corrosion - Cathodic protection - Sacrificial anode and impressed current cathodic protection method.

UNIT -3: POLYMERS (9)

Polymerization reactions - Basic concepts - Types of polymerization - Addition polymerization with mechanism - condensation polymerization - Plastics - Thermosetting and thermoplastics - Composition, Properties and Engineering applications of teflon, bakelite, nylon and rubber - Processing of natural rubber and compounding .Elastomers: Buna S - Buna N - Polyurethane Rubber and Silicone Rubber.

UNIT - 4: ELECTRO CHEMISTRY AND APPLICATIONS (9)

Electrodes-concepts-Reference electrodes- (Standard hydrogen electrode and calomel electrode)-Nernst equation. Electro Chemistry: Conductance - Equivalent conductance - Molar conductance –Effect of dilution- Conduct metric titrations (Acid –Base titrations) - Conductivity Measurements. Photo voltaic cells - working and applications- Fuel cells-Introduction - Hydrogen oxygen fuel cell and methanol fuel cell

UNIT - 5: FUNDAMENTAL ASPECTS OF INSTUMENTAL METHODS (9)

Chromatography:- Principle and methods of thin layer chromatography-separation of liquid of Paper chromatography. Electromagnetic spectrum-Absorption of radiation-Beer-Lamberts law-UV-Visible and IR spectroscopy-principle and instrumentation

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the will be able to,		POs related to Cos
CO1	To understand the fundamentals of water technology and develop analytical skills in determining the hardness of water and to acquire awareness to societal issues on quality of water.	**PO1, PO2,PO6**
CO2	Acquire the knowledge in corrosion phenomenon and develop skills in the design of methods for control of corrosion	**PO1, PO2**
CO3	Acquire knowledge on polymeric materials and to prepare polymeric material for environmental safety and society need.	**PO1, PO2,PO6**
CO4	Understand and apply the concept of electrochemistry and analyse the standard Electrodes and different types of fuels cells	**PO1, PO2**
CO5	Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials	**PO1, PO2,PO3**

TEXT BOOKS:

1. Prof. K. N. Jayaveera, Dr. G. V. Subba Reddy and Dr. C. Ramachandraiah, "Chemistry for Engineers", Tata McGraw Hill Publishers, New Delhi, 4/e, 2009.
2. Jain and Jain, "Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi.15/e, 2008
3. Text book of Engineering Chemistry, 18/e, 2008, S. S. Dara, S. Chand & Co, New Delhi.

REFERENCE BOOKS:

1. Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Ltd, Hyderabad,"Engineering Chemistry, 5/e, 2009.
2. B.Viswanath, M. Aulice Scibioh, "Fuel Cells Principles and Applications", Universities press, Hyderabad, 4/e, 2008.
3. Skoog and West, "Principles of Instrumental analysis",6/e Thomson,2007.
4. Glasston & Lewis, Dhanptharai Publishers, Physical Chemistry, New Delhi, 12/e, 2009.
5. JC Kuriacose and J. Rajaram ,"Engineering Chemistry (Vol.1&2)", Tata McGraw Hill Publishers, New Delhi, 5/e, 2004, ,

REFERENCE WEBSITES:

1.https://www.youtube.com/watch?v=zVZ9c6EXfTA
2.https://nptel.ac.in/courses/113/104/113104082/
3.https://nptel.ac.in/courses/104/105/104105039/
4.https://nptel.ac.in/courses/104/106/104106132/
5.https://www.digimat.in/nptel/courses/video/103108100/L01.html

CO-PO MAPPING:

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

I B.Tech. – I Semester

20BSC113	**APPLIED PHYSICS**	**L**	**T**	**P**	**C**
	(Common to ECE, EEE, CSE, CSM, CAI & CSD)	**3**	**0**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To identify the importance and applications Wave Optics in various Streams of Engineering
2. To understand the working principle and applications of Lasers and Optical fibers.
3. To elucidate the importance, properties and applications of Magnetic materials and Dielectrics
4. To use ideas with mathematical solutions to Quantum mechanics and its applications in Various atomic phenomena
5. To provide knowledge about semiconductors and Nanomaterials.

UNIT-1: WAVE OPTICS (7)

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton"s Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit – Grating spectrum.

UNIT-2: LASERS & FIBER OPTICS (9)

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein"s coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Applications.

UNIT-3: DIELECTRIC MATERIALS & MAGNETIC MATERIALS (9)

Dielectric Materials-Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials-Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia,para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

UNIT -4: QUANTUM MECHANICS, FREE ELECTRON AND BAND THEORY OF SOLIDES (10)

Quantum Mechanics- Dual nature of matter – Schrodinger"s time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well

Free Electron Theory-Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

Band theory of Solids- Bloch"s Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs K diagram – Classification of crystalline solids – Effective mass of electron – m^* vs K diagram – Concept of hole.

UNIT -5: SEMICONDUCTOR PHYSICS & NANOMATERIALS (10)

Introduction- Intrinsic and extrinsic semiconductor (Qualitative Analysis) – Carrier transport in Semiconductors - Drift & Diffusion –Einstein Equation – Direct and indirect band Gap Semiconductors-Hall Effect and its applications

NANOMATERIALS –Types of Nanomaterials (One dimensional, Two dimensional and Three-dimensional Nanomaterials) - Significance of Nanoscale - surface to, volume ratio –Quantum Confinement effect-Synthesis of Nanomaterials - Ball milling Method - Chemical vapour deposition methods –Optical, thermal, mechanical and electrical properties of Nanomaterials - Applications of Nanomaterials.

TOTAL HOURS: 45

COURSE OUTCOME:

On successful completion of the course the students will be able to		POs related to COs
CO1	Identify the importance and applications Wave Optics in various Streams of Engineering	**PO1, PO2**
CO2	Understand the working principle and applications of Lasers and Optical fibers	**PO1,PO2**
CO3	To elucidate the importance, properties and applications of Magnetic materials and dielectrics	**PO1, PO2**
CO4	Use ideas with mathematical solutions to Quantum mechanics and its applications in various atomic phenomena	**PO1,PO2,**
CO5	Provide knowledge about semiconductors and Nano materials	**PO1,PO2,PO12**

TEXT BOOKS:

1. Palanisamy ,"Engineering Physics", Palanisamy, Scitech Publications
2. K.Thyagarajan ,"Engineering Physics", McGraw Hill Publications
3. Maninaidu,"Engineering Physics", Pearson Publications

REFERENCE BOOKS:

1. Kittel ,"Solid State Physics", Wiley Publications
2. Gaur and Gupta , "Engineering Physics", Dhanpatrai Publications

REFERENCE WEBSITES:

1. https://www.youtube.com/watch?v=PEXSH8dB-Uk
2. https://www.youtube.com/watch?v=YvrwVK9ZqQY
3. https://www.digimat.in/nptel/courses/video/115107095/L01.html
4. https://www.youtube.com/watch?v=6QUFuZpCgGw
5. https://www.youtube.com/watch?v=etjZmdmrjSU
6. https://nptel.ac.in/courses/115/105/115105122/
7. https://nptel.ac.in/courses/108/108/108108122/
8. https://nptel.ac.in/courses/118/104/118104008/

CO-PO MAPPING:

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

I B.Tech. – I Semester

20ESC111	**ENGINEERING GRAPHICS**	**L**	**T**	**P/D**	**C**
	(Common to all branches)	**1**	**0**	**4**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To expose them to existing national standards related to technical drawings and develop knowledge of basic engineering curves.
2. To develop drawing skills for communication of concepts, ideas and design of projections of points, lines and planes.
3. To develop geometrical shapes and multiple views of projections of solids and sections of solids.
4. To develop drawing skills for communication of concepts, ideas and design the development of surfaces of objects and isometric views.
5. To develop geometrical shapes and multiple views of orthographic projections of solids and perspective views.

CONCEPTS AND CONVENTIONS (Not for Examination) (3)
Importance of drawings in engineering applications - Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets - Lettering, numbering and dimensioning – Basic geometrical constructions – Scales.

UNIT – 1: ENGINEERING CURVES (9)
Engineering Curves: Conics **–** Construction of ellipse, parabola and hyperbola by eccentricity method and rectangular hyperbola **–** Construction of cycloid, epi cycloid and hypo cycloid **–** Involutes of square, circle, pentagon and hexagon **–** Drawing of tangents and normal to the above curves

UNIT – 2: PROJECTION OF POINTS, LINES AND PLANE SURFACES (12)
Projection of Points: Principles of orthographic projection **–** First angle and third angle projections **–** Projection of points. **Projection of Lines:** Projection of straight lines (only first angle projections) inclined to one and both the principal planes **–** Determination of true lengths, true inclinations by rotating line and trapezoidal method and traces. **Projection of Planes:** Planes (polygonal and circular surfaces) inclined to both the principal planes by change of position method.

UNIT – 3: PROJECTION OF SOLIDS AND SECTION OF SOLIDS (12)
Projection of Solids: Projection of simple solids like prisms, pyramids, cylinder and cone, when the axis is inclined to one principal plane. **Section of Solids:** Sectioning of right regular solids like prisms, pyramids, cylinder and cone, solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other plane **–** Obtaining true shape of section.

UNIT – 4: DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTIONS (12)
Development of Surfaces: Development of lateral surfaces of simple and sectioned solids like prisms, pyramids, cylinder and cone. **Isometric Projection:** Principles of isometric projection **–** Isometric scale **–** Isometric views of simple solids and truncated solids like prisms, pyramids, cylinder and cone – Combination of two solid objects in simple vertical positions.

UNIT – 5: ORTHOGRAPHIC PROJECTIONS AND PERSPECTIVE PROJECTIONS (1)
Orthographic Projections: Visualization principles **–** Plane of projections **–** Representation of three dimensional objects **–** Layout of views **–** Sketching of multiple views from pictorial views of objects. **Perspective Projection:** Perspective projection of simple solids like prisms and pyramids by visual ray method.

Total Hours: 60

COURSE OUTCOMES:

On Successful Completion Of The Course, Students Will Be Able To		POs Related To COs
CO1	Construct the Engineering curves and generate tangent and normal for those curves.	**P01,P02,P03,P10**
CO2	Draw the projection of points, lines and plane surfaces.	**P01,P02,P03, P10**
CO3	Draw the projection of solids, sections of solids like prisms, pyramids, cylinder and cone.	**P01,P02,P03, P10**
CO4	Draw the isometric projections and views and also develop the development of surfaces.	**P01,P02,P03, P10**
CO5	Draw the orthographic and perspective projections of solids.	**P01,P02,P03, P10**

TEXT BOOKS:

1. N.D. Bhatt and V. M. Panchal , "Engineering Drawing" , Charotar Publishing House, 50th edition, , 2010.
2. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai. 2009.

REFERENCES BOOKS:

1. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Luzzader, Warren.J and Duff,John M, "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. K.Venugopal and V.Prabhu Raja ,"Engineering Graphics", New Age International (P) Limited. 2008.
4. M.B.Shah and B.C.Rana , "Engineering Drawing", Pearson Education, 2/e, 2009.
5. Basant Agarwal and C.M.Agarwal ,"Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, , 2008,

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/112/102/112102304/
2. https://nptel.ac.in/courses/112/105/112105294/
3. https://nptel.ac.in/courses/112/103/112103019/
4. https://nptel.ac.in/courses/112/104/112104172/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	1	-	-
CO2	3	3	3	-	-	-	-	-	-	1	-	-
CO3	3	3	3	-	-	-	-	-	-	1	-	-
CO4	3	3	3	-	-	-	-	-	-	2	-	-
CO5	3	3	3	-	-	-	-	-	-	2	-	-
CO*	**3**	**2.8**	**2.8**	**-**	**-**	-	**-**	**-**	**-**	**1.4**	-	**-**

20CSE111	C & DATA STRUCTURES (Common to ECE, EEE, CSE, CSM, CAI & CSD)	L	T	P	C
		2	1	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on algorithm, flowchart for a given problem and introducing the C programming basics.
2. To impart adequate knowledge on conditional and iterative statements for problem solving.
3. To familiarize with the pointers, structures and union.
4. To understand basic data structures.
5. To familiarize with several sub-quadratic sorting and searching algorithms.

UNIT -1: INTRODUCTION TO C (9)

Overview of Computers: Computer Software- Algorithm–Flowchart–Software Development Method.
C Programming Basics: Introduction to "C" Programming – Characteristics of C – Structure of a "C" program – Tokens –Constants- Variables – Data Types – Operators and their types-Expressions – Operator Precedence and Associativity.

UNIT -2: CONTROL STATEMENTS AND FUNCTIONS (9)

Conditionals: If-Else- Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement - Arrays: Initialization–Declaration - One-Dimensional Arrays-Two-Dimensional Arrays– Function Call and Returning Values – Parameter Passing – Local and Global- Scope – Recursive Functions.

UNIT -3: POINTERS, STRUCTURES AND UNIONS (9)

Pointers: Definition–Initialization–Pointers Arithmetic–Pointers and Arrays.
Structures and Union: Introduction – Need for Structure Data type – Structure Definition – Structure Declaration – Accessing Structure Members - Structure within a Structure – Copying and Comparing Structure Variables - Structures and Arrays – Union.

UNIT-4: INTRODUCTION TO DATA STRUCTURES (9)

Overview and importance of algorithms and data structures, Definition- Abstract Data Type, - Classification of Data Structures - Linear and Non Linear-List ADT –Single Linked List - Applications. Dynamic Memory Allocation and Deallocation

UNIT-5: SORTING AND SEARCHING TECHNIQUES (9)

Sorting Techniques: Insertion sort - Selection sort - Bubble sort - Quick sort - Merge sort.
Searching Techniques: Linear search - Binary Search

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the problem solving basics.	**PO1, PO2**
CO2	Identify and develop programs using control structures like selection control and iterative control statements.	**PO1, PO2, PO3**
CO3	Apply and Demonstrate knowledge on pointers, structure and union.	**PO1,PO2, PO3, PO4**
CO4	Categorize the basic data Structures and its applications	**PO1, PO2,PO5**
CO5	Illustrate different sorting and searching techniques to solve real- world problems	**PO1, PO3, PO4**

TEXT BOOKS:

1. PradipDey, and Manas Ghosh, "Programming in C", Oxford University Pres, 2018.
2. D. Samanta,"Classic Data Structure", Eastern Economy Edition, 2014
3. YashavantKanetkar,"Let us C", 15th Edition, BPB Publications, 2016.

REFERENCE BOOKS:

1. J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, "Programming in C and Data Structures", Pearson Education, Chennai, 2010.
2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2014.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2010 (Reprint).

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs11
2. https://onlinecourses.nptel.ac.in/noc22_cs40
3. https://www.geeksforgeeks.org.

CO-PO MAPPING:

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

20BSC114	ENGINEERING CHEMISTRY LABORATORY (Common to ECE, EEE, CSE, CSM, CAI & CSD)	L	T	P	C
		0	0	2	1

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide solid foundation in chemistry laboratory to solve engineering problems.
2. To apply the theoretical principles and perform experiments on hardness of water
3. To apply the theoretical principles and perform experiments dissolved oxygen, alkalinity, and acidity.
4. To Illustrates the properties of analytical equipments like red wood, Viscometer and conductometry

LIST OF EXPERIMENTS:

1. Preparation of Standard EDTA solution and Estimation of Hardness of Water
2. Preparation of Standard EDTA and Estimation of Copper
3. Estimation of dissolved oxygen in given water sample
4. Estimation of alkalinity of water
5. Estimation of Acidity of water sample.
6. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
7. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry
8. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide Solution by Conductometric titration
9. Conduct metric titration of $BaCl_2$ Vs Na_2SO_4 (Precipitation Titration).
10. Determination of viscosity of the given oils through Redwood viscometer

COURSE OUTCOMES:

On successful completion of the course the students will be able to		POs related to COs
CO1	Prepare standard solutions	**PO1,PO3**
CO2	Acquire knowledge about volumetric analysis of estimation copper by EDTA and by Iodometry	**PO1,PO2,PO3**
CO3	Acquire analytical skills in estimation of hardness of water,Alkanility and Acidity of water, dissolved oxygen in water and estimation of iron through laboratory methods	**PO1,PO2,PO3,PO6, PO12**
CO4	Acquire skills to use instrumental techniques for the determination of electrical conductance of electrolytes and viscosity of lubricants	**PO1,PO2,PO3**
CO5	Provide solutions for environmental issues through determination of quality of water	**PO1,PO2,PO3,PO6, PO7**
CO6	Communicate verbally and in written form pertaining to results of the Experiments	**PO1,PO2,PO8,PO9,**
CO7	Learns to perform experiments involving chemistry in future years.	**PO1,PO2,PO8,PO9, PO10**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO1,PO2,PO8,PO9,PO10**
CO9	Continue updating their skill related to chemistry laboratory.	**PO1,PO2,PO8, PO9,PO10**

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	2	-	-	-	-	-	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	2	2	-	-	-	-	-
CO6	2	2	-	-	-	-	-	2	2	-	-	-
CO7	2	2	-	-	-	-	-	2	2	2	-	-
CO8	2	2	-	-	-	-	-	2	2	2	-	-
CO9	2	2	-	-	-	-	-	2	2	2	-	-
CO*	**3**	**2**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**

I B.Tech – I Semester

		L	T	P	C
20BSC115	**ENGINEERING PHYSICS LABORATORY (Common to ECE, EEE, CSE, CSM)**	**0**	**0**	**2**	**1**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understands the concepts of interference, diffraction and their applications.
2. To understand the role of optical fiber parameters in communication.
3. Recognize the importance of energy gap in the study of conductivity
4. To Illustrates the properties of Magnetic and their applications
5. To understand and evaluate the properties of materials and sounds

S. NO.	NAME OF THE EXPERIMENT
1	Diffraction grating - Measurement of wavelength of given Laser.
2	To determine the frequency of AC using Sono meter
3	Determination of magnetic field along the axis of a current carrying circular coil - Stewart Gees method
4	Determination of numerical aperture and acceptance angle of an optical fiber
5	Determination of particle size using a laser source
6	Parallel fringes – Determination of thickness of thin object using wedge method
7	Newton"s rings – Determination of radius of curvature of given plano convex lens
8	B-H curve – Determination of hysteresis loss for a given magnetic material
9	Determination of Energy band gap of semiconductor
10	To find the rigidity modulus of the material using torsional pendulum

TEXT BOOKS:

1. Palanisamy ,"Engineering Physics", Palanisamy, Scitech Publications
2. K.Thyagarajan ,"Engineering Physics", McGraw Hill Publications
3. Maninaidu,"Engineering Physics", Pearson Publications

COURSE OUTCOMES:

On completion of the laboratory course the student will be able to		POs related to COs
CO1	Demonstrate Knowledge on measurement of various physical quantities using optical methods and fundamentals of magnetic fields	**PO1**
CO2	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	**PO2**
CO3	Provide valid conclusions on phenomena Interference and Diffraction	**PO4**
CO4	Follow the ethical principles in implementing the programs	**PO8**
CO5	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO6	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO7	Continue updating their skill related to loops, pointers and files implementing programs in future.	**PO12**

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	-	-	-	3	-	-
CO7	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

20CSE112	C & DATA STRUCTURE LAB	L	T	P	C
	(Common to CSE, ECE, EEE, CSM, CAI & CSD)	0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on flowchart and algorithm to the given problem
2. To exercise conditional and iterative statements to Write C programs
3. To develop the skill of C programs using arrays, strings and functions.
4. To understand C programs using pointers and allocate memory using dynamic memory management functions.
5. To familiarize with sorting and searching techniques.

EXERCISES:

1. a. Write a C Program to Calculate the Simple Interest.
   b. Write a C Program to Convert the Temperature Unit from Fahrenheit to Celsius using the Formula C= (F-32)/1.8.
   C. Assume that any Month is of 30 Days. Now you are given Total Days. Write a C Program to find out the exact Number of Years - Months & Days.

2. a. Write a Program that Prints the Given 3 Integers in Ascending Order using if - else.
   b. Write a Program to Calculate Commission for the Input Value of Sales Amount. Commission is calculated as per the Following Rules:
      i) Commission is NIL for Sales Amount Rs. 5000.
      ii) Commission is 2% for Sales when Sales Amount is >Rs. 5000and <= Rs. 10000.
      iii) Commission is 5% for Sales Amount >Rs. 10000.
   c. Write a C Program to find the Roots of Quadratic Equation.

3. a. Write a Program, which takes two integer Operands and one Operator from the User, Performs the Operation and then Prints the Result. (Consider the Operators +,-,*, /, %, use switch Statement)
   i) A Character is entered through Keyboard. Write a Program to determine whether the Character Entered is a Capital Letter, a Small Case Letter, a Digit or a Special Symbol. The Following Table shows the Range of ASCII values for various Characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 – 127.

4. a. Write a C Program to find the Sum of Individual Digits of a Positive Integer.
   b. A Fibonacci sequence is defined as follows: the First and Second terms in the Sequence are 0 and 1. Subsequent terms are found by adding the Preceding two terms in the Sequence. Write a C Program to Generate the first n terms of the Sequence.

5. a. i) A Perfect Number is a Number that is the Sum of all its Divisors Except Itself. Six is the Perfect Number. The only Numbers that Divide 6 evenly are 1, 2, 3 and 6 (i.e., 1+2+3=6).
      ii) An Abundant Number is one that is Less than the Sum of its Divisors (Ex: 12 <1+2+3+4+6).
      iii) A Deficient number is one that is Greater than the Sum of its Divisors (Ex: 9 > 1+3).
      Write a Program to Classify N Integers (Read N from keyboard) each as Perfect, Abundant or Deficient.

   b. An Armstrong Number is a Number that is the Sum of the Cubes of its Individual Digits. Write a C Program to Print Armstrong Numbers below 1000.

6. a. Write a C Program to generate all the Prime Numbers between 1 And N, Where N is a Value Supplied by the User.

i) Write a C Program to Calculate the Following Sum: Sum = 1 - x2/2! + x4/4! - x6/6! + x8/8! - x10/10!

7. a. Write a C Program to find both the Largest and Smallest Number in a List of Integers using Arrays.
   i) Write a C Program to Perform the Following:
   i) Addition of Two Matrices. ii) Multiplication of Two Matrices.

8. a. Write C Programs that use both Recursive and Non-Recursive Functions to find the Factorial of a given Integer.
   i) Write C Programs that use both Recursive and Non-Recursive Functions to find the GCD (Greatest Common Divisor) of two given integers.
   ii) Write C Program to solve Towers of Hanoi Problem using recursive function.
9. a. Write C Programs for Swap/Exchange values of two Integer variables using Call by Reference.
   i) Write a C Program using Pointers to Read in an Array of Integers and Print its Elements in Reverse Order.

10. Write a C Program using Dynamic Memory Allocation.

11. You are supposed to generate a Result Table which Consists of Student Id - Student Name - Marks of three Subject and Total Marks. Write a Program which takes Input for Five Students and Displays Result Table. Also Display Student Information Separately Who Got the Highest Total? Use Structures to do it.

12. Write C programs to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search

13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

14. Write a C Program that Implements the Following Sorting Methods to Sort a Given List of Integers in Ascending Order i) Quick sort ii) Merge sort

COURSE OUTCOMES:

On completion of the laboratory course the student will be able to		**POs related to COs**
CO1	Design the algorithm and flowchart for the given problem.	**PO1, PO2,PO3**
CO2	Develop the programs on control statements and arrays.	**PO1, PO2, PO3**
CO3	Analyze the concepts on functions	**PO1, PO2**
CO4	Solve the memory access problems by using pointers and design the programs on structures and unions.	**PO1, PO2, PO4**
CO5	Analyze the dynamic memory allocation and deallocation.	**PO1, PO2**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to loops, pointers and files implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, "Programming in C", Oxford University Press, 2018.
2. D. Samanta, "Classic Data Structure", Eastern Economy Edition, 2014.
3. Yashavant Kanetkar, "Let us C", 15th Edition, BPB Publications, 2016.
4. J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, "Programming in C and Data Structures", Pearson Education, Chennai, 2010.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs11
2. https://onlinecourses.nptel.ac.in/noc22_cs40
3. https://www.geeksforgeeks.org.

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	3	3	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	3	3	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	3	3	-	3	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	3	3	-	-	-	**-**	**-**	-	**-**	**-**	**-**	**-**
CO6	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**	**-**
CO7	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**
CO8	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	**-**	
CO9	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3
CO*	**3**	**3**	3	**3**	**-**	**-**	**-**	**3**	**3**	**3**	-	**3**

I B.Tech. – I Semester

		L	T	P/D	C
20ESC112	**ENGINEERING WORKSHOP AND IT WORKSHOP**				
	(Common to all branches)	**0**	**0**	**2**	**1**

COURSE EDUCATIONAL OBJECTIVES:

1. To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical and electrical engineering.
2. To include training on PC Hardware, Internet & World Wide Web and Productivity Tools including Word, Excel and Power Point.

A. ENGINEERING WORKSHOP

TRADES FOR EXERCISES:

1. **Carpentry:** Two exercises from: Middle T lap joint – Dove tail lap joint – Mortise and tenon joint from out of 300 x 50 x 35 mm soft wood stock.
2. **Sheet Metal:** Two exercise from: Square tray – Open scoop – Frustum of pyramid from out of 22 or 20 gauge G.I. sheet.
3. **Fitting:** Two exercises from: Square joint – V joint – Dove tail joint from out of 50 x 50 x 5 mm M.S. flat piece.
4. **House Wiring:** Two exercise from: Two lamps controlled by one switch in series and parallel – One lamp controlled by 2 two way switches (stair case) – Wiring for fluorescent lamp.
5. **Plumbing:** Two exercise from: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
6. **Machining:** Exercise on drilling and tapping.

TRADES FOR DEMONSTRATION:

a. Lathe machine.
b. Grinding machine.
c. Arc and gas welding.

COURSE OUTCOMES (ENGINEERING WORKSHOP):

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Demonstrate the knowledge on different tools used in carpentry, fitting, sheet metal, house wiring and plumbing sections and also basic machining process	**PO1**
CO2	Analyze the basic pipeline connection using different joints	**PO2**
CO3	Design and develop simple components by using different materials includes wood, GI sheet and MS plates	**PO3**
CO4	Apply basic electrical engineering tools on the house wiring practice	**PO5**
CO5	Follow the ethical principles in while doing the exercises.	**PO8**
CO6	Do the exercises effectively as an individual and as a team member in a Group	**PO9**
CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	**PO10**
CO8	Continue updating their skill related to trades.	**PO12**

TEXT BOOKS:

1. Lab manual provided by the department.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

B. IT WORKSHOP

PC HARDWARE

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva
5. **Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
6. **Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

LATEX AND WORD

7. Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
8. Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

EXCEL

9. Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be

covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

LATEX AND MS/EQUIVALENT (FOSS) TOOL POWER POINT

11. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it"s asked).
12. Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

INTERNET& WORLD WIDE WEB

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

    Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.
14. **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of the instructors. Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computers to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer.

COURSE OUTCOMES (IT WORKSHOP):

On the successful completion of this course, the student should be able to		POs related to COs
CO1	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	**PO1**
CO2	Demonstrate the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	**PO2**
CO3	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.	**PO3**
CO4	Familiarize with parts of MS Office, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	**PO5**
CO5	Follow the ethical principles in implementing the programs	**PO8**
CO6	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO7	Communicate verbally and in written form, the understanding about the experiments and	**PO10**
CO8	Continue updating their skill related to MS Office, Internet and Computer in future.	**PO12**

REFERENCE BOOKS:

1. Vikas Gupta,"Comdex Information Technology course tool kit" , WILEY Dream tech, New Delhi, 2003.
2. Cheryl A Schmidt, "The Complete Computer upgrade and repair book", WILEY Dream Tech,New Delhi, 3/e, 2008.
3. Introduction to Information Technology,ITL Education Solutions limited, Pearson Education, New Delhi, ,2008
4. Kate J. Chase , "PC Hardware and A+ Handbook", Microsoft press,2004.
5. Leslie Lamport, Addison Wesley, LaTeX Companion, New Delhi, 2/e, 2002
6. David Anfinson and Ken Quamme ,"IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, New Delhi,3/e, 2008.
7. Patrick Regan ,"IT Essentials PC Hardware and Software Labs and Study Guide", CISCO Press, Pearson Education, New Delhi, 3/e, 2008, ,
8. S.J.Bigelow , "Troubleshooting, Maintaining and Repairing PCs", TMH, New Delhi,5/e, 2008.

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	-	**-**	**3**	**3**	**3**	-	**3**

20HSM111	COMMUNICATIVE ENGLISH FOR ENGINEERS (Common to All Branches)	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Nil

EDUCATIONAL OBJECTIVES:

1. To Provide Knowledge on developing Vocabulary and communicating in a verbal manner.
2. To understand in using of technology for societal aspects.
3. To recognize the importance on constructing Entrepreneurship Skills.
4. To Execute Contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.
5. To support and identify the earlier Medical Life Sciences used in India

UNIT-1: COMMUNICATION SKILLS FOR PROFESSIONALS (9)

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Articles and prepositions and word formation. Content words and function words.

UNIT-2: TECHNOLOGY WITH A HUMAN FACE A LECTURE BY E.F.SCHUMACHER (9)

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics.
Reading:. Identifying sequence of ideas recognizing verbal techniques.
Writing: Paragraph writing (specific topics) using suitable cohesive devices;mecahanics of writings.
Grammar and Vocabulary: Word formation (Derivtion,Borrowing-coinage-compounding)
Tenses.

UNIT-3: AZIM PREMJI-AN ENTREPRENEUR (9)

Listening: Identifying the topic, specific pieces of information by listening to short audio texts.
Speaking: Discussing daily routine activities.
Reading: Phrasal verbs often used in daily conversations.
Writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Letter writing (official) - voice of verbs

UNIT -4: REFLECTIONS OF FUTURE THE YEAR –BY THEODORE J.GORDON (9)

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Direct and Indirect speech-Email writing.

UNIT -5: Y.SUBBA ROW (9)

Listening: Identifying the topic, specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs introducing the topic summarizing the main idea and providing a transition to the next paragraph.
Grammar and Vocabulary: Subject verb agreement- Report writing.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, student will be able to		POs related to COs
CO1	Understand the concepts on developing vocabulary and communicating in a verbal manner.	**PO1**
CO2	Understand and develop knowledge on the use of Technology for social aspects.	**PO5**
CO3	Understand Acquiring skills to become an able Entrepreneur	**PO2**
CO4	Understand contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.	**PO6**
CO5	Understand the importance of Medical advancement and its uses on Human life in India..	**PO4**

TEXT BOOKS:

1. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja,"Functinal English 1" The Department of English of SITAMS ,1/e. 2016
2. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja,"Functinal English 2" The Department of English of SITAMS ,1/e. 2016

REFERENCE BOOKS:

1. K.Srinivasa Krishna , B.Kuberudu , "Business communication and softskills", Excel Books ,1/e 2008.
2. K.R. Lakshminarayana , "English for Technical communication" ,Scitech Publishers, 2/e, 2009
3. R.K. Bansal ,J.B. Harrison, "Spoken English", Orient Longman, Mumbai, 2/e,2009
4. Raymond Murphy ,Murphys English Grammar, Raymond Murphy Publishers , 2/e, 2006 Cambridge English Dictionary for advanced Learners.
5. Inspiring Lives by Dr. Jandhyala Ravindranath,Dr.M.Sarath Babu

REFERENCE BOOKS:

1. www.english club.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english/
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

CO-PO MAPPING

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

I B.Tech. – II Semester

20BSC121	**DIFFERENTIAL EQUATIONS AND TRANSFORMATION TECHNIQUES (COMMON TO ALL BRANCHES)**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1: To learn the methods of solving the ordinary differential equations of first & higher order and applications of first order ordinary differential equations.
2: To learn partial differential equations and how they can serve as models for physical processes and also master the technique of separation of variables to solve partial differential equation.
3: To learn the concepts of Laplace Transforms and inverse Laplace Transforms and to explore the solving initial value problems by using Laplace transform method.
4: To develop skill to design Sine and Cosine waves with the help of Fourier series
5: To learn the concepts of Fourier transform and inverse Fourier Transform.

UNIT -1: ORDINARY DIFFERENTIAL EQUATIONS (9)

Differential Equations of First Order and First Degree: Formation – Linear and Bernoulli"s equations – Applications to L-R and C-R circuit"s problems.

Linear Differential Equations of Higher Order: Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, Cos ax, polynomials in x, e^{ax} v(x) & x^m v(x) - Method of variation of parameters.

UNIT -2: PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of first order linear (Lagrange"s) equation and Non-Linear (standard forms) equations - Solution of PDE by the Method of separation of variables.

UNIT -3: LAPLACE TRANSFORMS (9)

Definition of Laplace transform, Laplace transform of standard functions - Laplace Transform of Unit step function, Dirac"s delta function and Periodic function – Properties of Laplace Transforms(without proof): Linear property, First shifting theorem, Change of Scale Property, Second shifting theorem, Multiplication & Division by t, Transform of Derivatives & Integrals - Inverse transform - Convolution theorem(without proof) – Application: Solution of ordinary differential equations of first and second order with constant coefficients.

UNIT -4: FOURIER SERIES (9)

Determination of Fourier coefficients, Euler"s formulae, Dirichlet"s conditions - Fourier series of periodic functions, even and odd functions - Fourier series in an arbitrary interval - Half-range Fourier sine and cosine expansions.

UNIT -5: FOURIER TRANSFORM (9)

Fourier integral theorem (without proof) - Fourier sine and cosine integrals - Fourier transform – Fourier sine and cosine transforms - Properties - Inverse transforms - Finite Fourier transforms.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	To identify whether the given differential equation of first order is linear or Bernoulli and to solve the higher order linear differential equations with constant coefficients.	**PO1,PO2,PO3**
CO2	Apply a range of techniques to find solutions of standard PDE"s and outline the basic properties of standard PDE"s	**PO1,PO2,PO3**
CO3	To understand the concepts of Laplace transform and elementary functions, general functions using its properties and special functions.	**PO1,PO2,PO3**
CO4	To understand finding Fourier series expression of the given function.	**PO1,PO2,PO3**
CO5	Understand Fourier transforms and properties of Fourier transforms	**PO1,PO2,PO3**

TEXT BOOKS:

1. K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad,"Engineering Mathematics–I", T, S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad,"Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 44/e, 2017.

REFERENCE BOOKS:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. Dr. M. K. Venkata Ramana, "Higher Engineering Mathematics", National Pub & Co, Madras.
3. N.P.Bali , "A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, New Delhi.
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-II", Pearson Educations, Chennai.

REFERENCE WEBSITES:

https://nptel.ac.in/courses/111/106/111106100/
https://www.youtube.com/watch?v=OBhZvyhc8JQ&t=982s
https://nptel.ac.in/courses/111/106/111106100/
https://www.youtube.com/watch?v=3zCdNO2xp3s
https://www.youtube.com/watch?v=XU5hUrh6-18&t=948s
https://nptel.ac.in/courses/111/106/111106139/
https://www.youtube.com/watch?v=LGxE_yZYigI
https://www.youtube.com/watch?v=6spPyJH6dkQ
https://www.youtube.com/watch?v=GFKggEkKtLM

CO-PO MAPPING:

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

20ECE111	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Nil

Course Educational Objectives:

1. To study the basic concepts and characteristics of the PN Junction diodes.
2. To understand and analyze the working principle of Rectifier & Filter circuits and their application
3. To study and analyze the working principle and characteristics of BJT
4. To study and analyze the working principle and characteristics of FET
5. To understand the working principle and characteristics of special devices.

UNIT-1: Junction Diode Characteristics (9)

Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance and its application, Zener diode – V-I Characteristics.

UNIT-2: Rectifiers and Filters (9)

Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors, Zener diode regulator.

UNIT-3: BJT Transistor Characteristics: (9)

Junction transistor, transistor current components, transistor configurations, Characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through.

UNIT-4: FET Transistor Characteristics: (9)

Construction and principle of operation and characteristics of JFET & MOSFET (Enhancement & Depletion mode)**.** Biasing of FET, FET act as voltage variable resistor, comparison of BJT and FET

UNIT-5: Special Semiconductor Devices (9)

Principle of operation, characteristics and applications of - Varactor diode, Tunnel diode, Uni Junction Transistors, Silicon Controlled Rectifier, Scottky diode, LED, Photo transistor.

Total hours: 45

COURSE OUTCOMES :

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate concepts and Analyze the characteristics of the PN Junction diodes.	**PO1, PO2**
CO2	Design and Analyze of Rectifiers & Filters circuits and its application.	**PO1,PO2,PO3**
CO3	Design and investigate the working of BJT transistor and its configurations and characteristics	**PO1,PO2,PO3, PO4**
CO4	Design and analyze the working of FET, MOSFET and special diodes.	**PO1, PO2,PO3,PO4**
CO5	Demonstrate knowledge on special devices and analyze their VI characteristic.	**PO1, PO2**

TEXT BOOKS:

1. J. Millman, C. Halkias, Tata Mc-Graw Hill, "Electronic Devices and Circuits",2e
2. Jacob Millman, C. Halkies, C.D.Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.

REFERENCES BOOKS:

1. K. Satya Prasad , "Electronic Devices and Circuits", VGS Book Links.
2. Salivahanan, Kumar,Vallavaraj , "Electronic Devices and Circuits", Tata Mc-Graw Hill, 2e.
3. David Bell ,"Electronic Devices and Circuits" ,Oxford Press.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/117/103/117103063
2. https://nptel.ac.in/courses/108/101/108101091
3. http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html
4. https://www.allaboutcircuits.com/video-lectures

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	**-**	**-**	**-**	-	-	-
CO*	**3**	**2.8**	**2**	**2**	-	-	**-**	**-**	**-**	**-**	**-**	**-**

I B.Tech - II Semester

20ESC113

	L	T	P	C
BASIC ELECTRICAL ENGINEERING	**2**	**1**	**0**	**3**

(Common to CSE, CSM, CAI & CSD)

PRE-REQUISITES: Nil

Course Educational Objectives:

On successful completion of the course, students will be able to

1 Impart knowledge on fundamentals of electrical circuits
2 Analyzing different factors of various periodic waveforms
3 Introduce phenomenon of DC Machines.
4 Understand construction and operation of A.C. machines
5 Impart knowledge on basic principles of electrical measuring instruments

UNIT-1: INTRODUCTIONTO ELECTRICAL ENGINEERING: (9)

Ohm"s Law, Basic Circuit Components, Kirchhoff"s laws, Simple Problems. Types of Sources, Series, Parallel Circuits, Star-Delta Transformation, Network Theorems-Superposition and reciprocity, Thevenin"s and Norton"s Theorems and Maximum Power Transfer Theorem.

UNIT-2: SINGLE PHASE AC CIRCUITS (9)

R.M.S, Average values and form factor for different periodic waveforms - phase and phase difference of sinusoidal alternating quantities - steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance - Power triangle, power factor

UNIT-3: DC MACHINES (9)

Principle of Operation of DC Generators, Types of DC Generators, EMF Equation in DC Generator, OCC of a DC Shunt Generator. Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency, Calculation in DC Motors, Swinburne"s Test and Brake Test, Speed control of DC Shunt motor.

UNIT-4: AC MACHINES (9)

Principles of Operation of Transformer, Constructional Details, Losses and Efficiency, Regulation of Transformer, O.C and S.C Tests - Principles of Operation of Three Phase Induction motor

UNIT-5: MEASURING INSTRUMENTS: (9)

Introduction, Classification of Instruments, Operating Principles, Essential Features of Measuring Instruments, Moving Coil and Moving Iron Instruments, Dynamometer Wattmeter and Energy meter

Total hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Understood the concept of electrical circuits	**PO1, PO2, PO3,PSO12**
CO2	Investigated the different AC circuits	**PO1, PO2, PO3,PSO12**
CO3	Analysed the operation of DC Machines.	**PO1, PO2, PO3,PSO12**
CO4	Analysed the operation of DC Machines.	**PO1, PO2, PO3,PO12**
CO5	Understand and evaluate the calibration of different electrical measuring instruments.	**PO1, PO2, PO3,PO12**

TEXT BOOKS:

1. M.S.Naidu and S Kamakshaiah, "Basic Electrical Engineering".
2. T.KNagasarkar and M.S Sukhija,"Basic Electrical Engineering"
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCE BOOKS:

1. DP Kothari and IJ Nagrath , "Theory and Problems of BEE".
2. V.K Mehtha, "Principle of Electrical Engineering",S Chand Publications.
3. Joseph A. Edminister, MahmoodNahri, "Electric circuits", Schaum"s series, McGraw-Hill, New Delhi, 2010.
4. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/108/105/108105053/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2
CO2	3	3	2	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2
CO3	3	2	2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2
CO4	3	3	2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2
CO5	3	3	2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	2
CO*	**3**	**2.6**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	**2**

20ESC115	PROGRAMMING WITH PYTHON (Common to All Branches)	L 2	T 1	P 0	C 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1: To impart the basics of python and its IDEs.
2: To understand the basic data structure in python.
3: To familiarize with python GUI and files.
4: To develop broad understanding of various object-oriented concepts in python.
5: To introduce the python libraries for solving real-time problems.

UNIT 1: BASICS OF PYTHON (9)
Python programming language: About Python- Introduction to various IDEs- IDLE- PyCharm, Spyder- Sublime text- Jupyter Notebook.
Literals: Numeric literals - String literals- Variables and Identifiers: Variable assignment and keyboard input – Identifiers - keywords and other predefined identifiers.
Control Structures: Sequential control- Selection control- Iterative control statements.

UNIT 2: LISTS, DICTIONARIES AND SETS (9)
Lists: List structures - Common list operations - List traversal - Lists in Python - Python list type –Tuples – sequences - Nested lists - Iterating over lists in python.
Dictionaries and Sets: Dictionary types in Python - Set data type- Strings and its operations.

UNIT 3: FUNCTIONS AND TEXT FILES (9)
Functions: Function declaration- Category of Functions- Parameter Passing -Keyword Arguments in Python - Default Arguments in Python - Variable Scope, Lambda function.
Files: Fundamentals – opening, reading and writing text files, .csv and .xlsx files.

UNIT 4: OBJECT-ORIENTED CONCEPTS USED IN PYTHON (9)
Features of object-oriented programming-Fundamental concepts- Class- Encapsulation- Inheritance- Polymorphism. Object references - Turtle graphics - creating a Turtle Graphics Window - the "Default" Turtle - Fundamental Turtle Attributes and Behavior - Additional Turtle Attributes - Creating Multiple Turtles.

UNIT 5: INTRODUCTION TO PYTHON LIBRARIES (9)
Python Libraries- Introduction to Libraries- Creating and Exploring Packages-Numpy, SciPy, matplotlib, Pandas, Scikit-learn- seaborn.

Total hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Identify and apply the appropriate control statements for solving problems.	**PO1, PO2, PO5**
CO2	Demonstrate knowledge of basic data structures and functions.	**PO1, PO3, PO4**
CO3	Analyse and apply the appropriate file handling mechanism.	**PO1, PO2, PO5**
CO4	Identify and implement the suitable object-oriented concepts.	**PO1, PO2, PO5**
CO5	Evaluate the real-world problems using python packages.	**PO1, PO4, PO5**

TEXT BOOKS:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
2. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publisheers, 2020.

REFERENCE BOOKS:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", SecondEdition,Shroff/O„ReillyPublishers,(http://greenteapress.com/wp/thinkpython/), 2016
2. Charles Severance, "Python for everybody: exploring data in Python 3", Creative Commons Attribution-Non Commercial Share Alike 3.0 Unported License, 2016.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/aic20_sp33
2. https://onlinecourses.nptel.ac.in/noc22_cs32
3. https://spoken-tutorial.org
3. https://www.w3schools.com/python.
4. https://www.geeksforgeeks.org.

CO-PO MAPPING:

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

I B.Tech – II Semester

20HSM112	COMMUNICATIVE ENGLISH LANGUAGE LAB (Common to All Branches)	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide Knowledge on developing Soft Skills and its techniques.
2. To understand Knowledge on the use of technology for giving Presentations.
3. To apply gained information in Preparing Resume.
4. To analyze the use of body language while participating in Group Discussions.
5. To execute the complete knowledge on facing Job Interviews.

LIST OF TOPICS:

1. Introduction and importance of Soft Skills
2. Attributes of Soft Skills
3. Categories of Soft Skills- (Social, Thinking, Negotiating)
4. Exhibiting, Identifying, and Improving your Soft Skills
4. Acquiring Soft Skills (Train yourself)
5. Soft Skills practicing tips
6. Power Point presentation on Scientific/Technical Topics.
7. Designing a Resume
8. Resume Styles
9. Preparing Model Resumes
10. Group Discussion
11. Group Discussion strategies
12. Mock GDs.
13. Job Interviews
14. Interview Techniques
15. Model Interview questions – Mock Interview

COURSE OUTCOMES:

At the end of the course, students will able to		**POs related to COs**
CO1	Remembering the concepts on developing Soft Skills and its techniques. (Topics from 1 to 5)	**PO1**
CO2	Understand and Develop Knowledge on the use of technology in giving presentations. (Topic No:6)	**PO5**
CO3	Apply one"s skills in Preparing a Resume before applying for a job.(Topic 7 to 9)	**PO6**
CO4	Analyze and execute body language while participating in Group Discussions. (Topics 10 to 12)	**PO2**
CO5	Evaluate by weighing one"s communicative skills in facing Job Interviews through Mock Interviews. (Topics 13 to 15)	**PO10**

SOFT WARE SUGGESTED: Walden –Hyderabad**.**

REFERENCES:

1. Dr.K.Alex,"Soft Skills- Know yourself and know the world", S. Chand Publications, New Delhi, 2010
2. T.Vijayakumar, K.Durga Bhavani,English in Action 1st Edition, 2019, Mac millan Publications, Guntur.
3. Rout ledge, "Bailey Stephen Academic Writing – A Hand book for international students", 2014.
4. Chase, Becky Tarver," Pathways: Listening, Speaking and Critical Thinking. Heinley ELT", 2e/ 2018.
5. Hewings, Martin, "Cambridge Academic English (B2)". CUP, 2012

CO-PO MAPPING:

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

20ESC117	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB (Common to CSM & CSE)	L	T	P	C
		0	0	2	1

PRE-REQUISITES: Nil

Course Objectives:
On successful completion of the course, students will be able

1. To gain practical experience on fundamental electric laws.
2. To gain practical experience on verification of theorems.
3. To evaluate the performance characteristics of DC shunt generator.
4. To evaluate the performance characteristics of DC shunt motor.
5. To evaluate the Characteristics of diode, rectifiers and filters.

PART -A

Any SIX of the Following

1. Verification of KCL and KVL
2. Verification of Superposition Theorem and Reciprocity Theorem.
3. Verification of Thevinin"s and Norton"s Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Magnetization Characteristics of D.C Shunt Generator.
6. Swinburne"s Test of DC Shunt Machine.
7. Brake Test on DC Shunt Motor &Determination of Performance Characteristics.
8. OC & SC Tests on Single-Phase Transformer to find the Efficiency.

PART -B

Any SIX of the Following

1. Volt-Ampere Characteristics of P-N Junction Diode and Zener Diode.
2. Rectifiers-Without Filter.
3. Rectifiers-With Filter.
4. BJT Characteristics (CE&CB Configuration).
5. Transistor as a Switch.
6. FETCharacteristics.
7. UJT Characteristics.
8. SCR Characteristics.

COURSE OUTCOMES:

At the end of the course, students will able to

	Course Outcomes	POs related to COs
CO1	**Understand** the fundamental electrical laws in engineering applications.	**PO1**
CO2	**Verify** different network theorems practically.	**PO2**
CO3	**Design** electrical circuits for measuring complicated electrical parameters.	**PO3**
CO4	**Investigate** AC Machines like Induction Motor and Transformer for solving complex problems.	**PO4**
CO5	**Evaluate** the Characteristics of D.C Shunt Generator and DC Motor through experimentation.	**PO4**
CO6	Follow the **ethical principles** in implementing the experiments.	**PO8**
CO7	Do experiments effectively as an **individual and as a team member** in a group.	**PO9**
CO8	**Communicate** verbally and in written form, the understanding about the experiments.	**PO10**
CO9	**Continue updating their skill** related to electrical circuits	**PO12**

REFERENCE WEBSITE

1. https://nptel.ac.in/courses/117/106/117106108/

CO-PO MAPPING:

CO-PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	
CO9												3
CO*	**3**	**3**	3	**3**	-	-	-	**3**	**3**	**3**		**3**

20ESC118	PROGRAMMING WITH PYTHON LAB (Common to All Branches)	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1: To understand the basic IDEs in python.
2: To gain expertise for problem solving using control structures in python
3: To develop the python programs using functions.
4: To solve various engineering problems using different data structures.
5: To gain knowledge on python libraries.

RECOMMENDED SYSTEMS/SOFTWARE REQUIREMENTS:

- For Windows: IDLE/ Spyder python development environment.
- For Linux: Default python version installed/ higher version.

LIST OF TASKS:

TASK-1: BASICS

a) Develop a simple python scripts to illustrate numeric literals and string literals.
b) Write a Python Program to Convert Kilometres to Miles

TASK-2: LOOPS

a) Write a python Program to Make a Simple Calculator
b) Write a python program that reads a rating from the user and indicates whether the performance was unacceptable, acceptable or meritorious. The amount of the employee"s raise should also be reported. Your program should display an appropriate error message if an invalid rating is entered. (The amount of an employee"s raise is $2400.00 multiplied by their rating).

Rating	Meaning
0.0	Unacceptable performance
0.4	Acceptable performance
0.6 or more	Meritorious performance

TASK-3: LOOPS

a) Write a program containing a pair of nested while loop that displays the integer values 1–100. Ten numbers per row - with the columns aligned as shown below

```
 1  2  3  4  5  6  7  8  9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
                .
                .
91 92 93 94 95 96 97 98 99 100
```

b) Display the integer values 1–100 as given in question 3a) using only *one* while loop.

TASK-4: DICTIONARIES

a) Write a Python script to generate all the possible spellings of the last four digits of any given phone number – use Dictionaries.

TASK-5: STRINGS

a) Write a program to figure out if the register number format is correct or not using a Python code. (Hint: sample register number format- 20751A0500). Use string methods to solve the above problem.

TASK-6: FUNCTIONS

a) Write a function that generates a random password. The password should have a random length of between 7 and 10 characters. Each character should be randomly selected from positions 33 to 126 in the ASCII table. Your function will not take any parameters. It will return the randomly generated password as its only result. Display the randomly generated password in your file"s main program. Your main program should only run when your solution has not been imported into another file.

TASK-7: PATTERN PRINTING

a) Write a python program to print half pyramid pattern with star (asterisk)

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

b) Write a python program to print the characters/alphabets in right-angled triangle pattern.

```
A
B C
D E F
G H I J
K L M N O
P Q R S T U
V W X Y Z [ \
```

TASK-8: TURTLE

a) Write a python program to draw the basic shapes using turtle (Hint: Square, circle, triangle).

TASK-9: FILES

a) Write a python script to create a simple text file. Write the contents into the created file and read the contents from the file and display the same on to the console screen.
b) Write a python script to Create and write on excel file using xlsxwriter module.
c) Write a python script to write the contents into a csv file.

TASK 10: FILE HANDLING

Write a python program to perform the following tasks:

a) Copy the contents of one file into another file.
b) Count number of lines in a file.
c) Count number of characters in a file.
d) Count number of words in a file.

TASK 11: INHERITANCE

a) Write a python program to illustrate the inheritance concept.

TASK-12: MATH LIBRARIES

a) Write a python program to calculate area of a circle. Use the pi constant in the math module in your calculations. ($\text{Area of the circle} = \pi r^2$)
b) Write a python program to calculate Volume of a sphere. Use the pi constant in the math module in your calculations. ($\text{Volume of a sphere} = \frac{4}{3}\pi r^3$).

TASK-13: PANDAS

a) Write a Pandas program to create a line plot of the historical stock prices of a company between two specific dates.

TASK-14: PANDAS

a) Write a Pandas program to create a bar plot of the trading volume of a company stock between two specific dates.

COURSE OUTCOMES:

On successful completion of this course the students should be able to:		POs related to COs
CO1	Learn various problem solving approaches and ability to identify an appropriate approach to solve the problem	**PO1, PO2, PO3, PO5**
CO2	Implement conditionals and loops to design the python programming	**PO1, PO2, PO3, PO5**
CO3	Implement lists, set, tuples and dictionaries to develop python program.	**PO1, PO2, PO3, PO5**
CO4	Able to modulate the given problem using structural approach of programming	**PO1, PO2, PO3, PO5**
CO5	Build Python Programs using packages to solve real-time problems.	**PO1, PO2, PO3, PO4,PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
2. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publisheers, 2020.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/aic20_sp33
2. https://onlinecourses.nptel.ac.in/noc22_cs32
3. https://spoken-tutorial.org
4. https://www.w3schools.com/python.
5. https://www.geeksforgeeks.org.

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	3	3	3	-	2	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	-	-	-	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-
CO4	3	3	3	-	2	-	-	-	-	-	-	-
CO5	3	3	3	3	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**3**	**3**	**3**		**3**

II B.Tech - III Semester

20BSC233	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	L	T	P	C
	(Common to CSE, CSM, CAI, CSD)	2	1	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To gain the knowledge on connectives and relate the laws of logic to find the disjunctive normal form and conjunctive normal form of compound proposition.
2. To learn the various concepts related to predicate logic.
3. To perform the operations associated with sets, functions, and relations and study the basic Properties of lattices.
4. To understand the concept of groups, Abelian groups and group homomorphism and isomorphism.
5. To study the fundamentals of graphs, sub graphs, planar graphs, Hamiltonian graphs, Euler graphs, Spanning trees and graph traversals.

UNIT –1: MATHEMATICAL LOGIC (9)

Mathematical logic: Statements and Notations - Connectives(Negation, Conjunction , Disjunction, Conditional and Biconditional) - Statements Formulas and Truth Tables - Well-Formed Formulas, Tautologies - Equivalence of Formulas - Duality Law - Tautological Implications - Normal Forms(DNF, CNF, PDNF, PCNF) - Theory of Inference for Statement Calculus: Validity using Truth tables - Rules of Inference - Consistency of Premises and Indirect Method of Proof.

UNIT –2: PREDICATE CALCULUS (9)

Predicates – open statements-Quantifiers- Variables- Free and Bound Variables -Truth value of a quantified statements- Two rules of Inference-Logical equivalence- Rules for negation of a quantified statements- Theory of Inference for Predicate Calculus - statements with more than one variable.

UNIT –3: RELATIONS & FUNCTIONS (9)

Relations: Properties of Binary Relations, Equivalence Relations - Compatibility and Partial Ordering Relations - Hasse Diagram - Lattices (Basic Concepts) - Functions: Inverse function - Composition of Functions - Recursive Functions - Pigeon Hole Principles and its Applications.

UNIT –4: ALGEBRAIC STRUCTURES (9)

Algebraic Systems - Examples and General Properties - Semi Groups - Monoids - Groups and Subgroups - Homomorphism and Isomorphism.

UNIT –5: GRAPH THEORY (9)

Basic Terminology - Multi Graphs - Weighted Graphs - Digraphs and Relations - Representations of Graphs (Incidence Matrix, Adjacency Matrix) - Operations on Graphs - Isomorphism and Sub Graphs. Paths and Circuits - Graph Traversals(DFS, BFS) - Eulerian Paths and Circuits - Hamiltonian Paths and Circuits - Planar Graph - Graph Coloring - Spanning Trees - Minimum Spanning Trees - Kruskal"s Algorithm - Prim"s Algorithm.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the validity of statements using connectives, tautologies, equivalence, implications and solve the problems using normal forms.	**PO1, PO2, PO3**
CO2	Solve the problems using statement calculus, predicate calculus and analyze the equivalence of quantified statements.	**PO1, PO2, PO3**
CO3	Identify and describe various types of relations (Compatibility, Partial ordering and Equivalence relations) and analyze the functions concepts and distinguish different types of functions.	**PO1, PO2, PO3,PO4**
CO4	Understand the concept of groups, Abelian groups and analyze whether the given set satisfies the properties of group or not.	**PO1,PO2**
CO5	Design network applications using Prim"s and Kruskal"s Algorithms and Demonstrate different traversal methods for graphs.	**PO1, PO2, PO3,PO4**

TEXT BOOKS:

1. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 27/e, Tata McGraw Hill Publishers, 2006, New Delhi.
2. C.L. Liu, D.P. Mohapatra, "Elements of Discrete Mathematics – A Computer Oriented Approach", 3/e, Tata McGraw Hill Publishers, 2008, New Delhi.
3. D.S. Chandrasekharaiah, "Mathematical Foundations of Computer Science", 3/e, Prism Books Pvt. Ltd., 2001.Bangalore

REFERENCE BOOKS:

1. Ralph. P. Grimaldi, "Discrete and Combinational Mathematics – An Applied introduction", 5/e, Pearson Education, 2008, New Delhi.
2. Kenneth H. Rosen, "Discrete Mathematics and its applications",6/e, Tata McGraw Hill Publishers, New Delhi.
3. Mott, Kandel, Banker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2/e, Prentice Hall India, 2007, New Delhi.
4. Lipschutz, Lipson, Schaum"s outlines, "Discrete Mathematics",2/e, Tata McGraw Hill Publishers, 2006, New Delhi.
5. Gary Haggard, John Schlipf, Sue Whitesides, "Discrete Mathematics for Computer Science", 4/e, Thomson Publications, 2008,New Delhi.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/108/106108227/
2. https://nptel.ac.in/courses/106/103/106103205/

CO-PO MAPPING:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	--	-	-	-	-	-	-	-	-
CO2	3	3	3	--	-	-	-	-	-	-	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	-
CO4	2	3	--	--	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
CO*	2.8	3	2.75	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.Tech – III Semester

20ESC237	**DIGITAL LOGIC DESIGN AND MICROPROCESSOR** (Common to CSE, CSM, CAI, CSD)	**L T P C** **2 1 0 3**

PRE-REQUISITES: Nil

Course Educational Objectives:

1. To Provide Knowledge On number systems, coding and basic logic functions.
2. To develop skill to minimize switching functions in effective way using K-MAP
3. To develop skill to design combinational logic circuits.
4. To provide knowledge on architecture of 8086 microprocessor.
5. To develop the skill on programming of 8086 and 8051 microcontroller

UNIT -1: NUMBER SYSTEMS & CODES (9)

Review of Number Systems- Binary Arithmetic-Subtraction with r and (r-1)"s Complements- Weighted & Non Weighted Codes- Error Detection and Error Correction Codes- Hamming Code, Introduction to ASCII code - Basic Logic Operations of (NOT, OR, AND), Universal Gates - EX-OR & EX-NOR Gates.

UNIT- 2: MINIMIZATION OF LOGIC FUNCTIONS (9)

Boolean Algebra : Boolean Theorems- Complement and Dual of Logical Expressions- Minimization of Logic Functions using Demorgan"s Theorems. Standard SOP and POS, Minimal SOP and POS Realization, Minimization of Switching Functions using K-Map upto 5 variables.

UNIT -3: COMBINATIONAL & SEQUENTIAL LOGIC CIRCUITS (9)

Design of Half Adder - Full Adder - Half Subtractor- Full Subtractor- 4-Bit Binary Adder-4-Bit Adder Subtractor- BCD Adder- Magnitude Comparator – Decoder- Encoder- Multiplexer – De Multiplexer. Basic Latches & Flip Flops-SR, D, JK, T – Design of Shift Registers-Universal Shift Register, Design of Synchronous and Asynchronous Counters.

UNIT-4: INTRODUCTION TO 8086 MICROPROCESSOR (9)

8085 Overview, 8086 Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration, Minimum and Maximum Mode Signals, Interrupts in 8086.

UNIT -5: 8086 INSTRUCTION SET & 8051 MICROCONTROLLER (9)

Instruction set of 8086, Assembler directives, Simple programs involving arithmetic, logical, branch instructions, Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051(Brief details only), Simple Programs

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Demonstrate knowledge on types and conversion of number systems, Error Detection and Error Correction arithmetic and logical operations of different radix and applying boolean algebra for switching functions reduction.	**PO1, PO2**
CO2	Identify the most efficient grouping to minimize the switching functions using k-map.	**PO1,PO2**
CO3	Design the combinational logic circuits and realize for given specifications.	**PO1,PO2,PO3**
CO4	Understand the knowledge 8086 microprocessor and its architecture	**PO1,PO2,PO3**
CO5	Analyze the instruction set of 8086 and 8051 microcontroller architecture and instruction set.	**PO1,PO2,PO3,PO4**

TEXT BOOKS:

1. Morris Mano, "Digital Design", Prentice Hall of India, 3/e, 2006.
2. Thomas L.Floyd, "Digital Fundamentals", Pearson/Prentice Hall, 10/e, 2008.
3. A.K.Ray and K.M.Bhurchandi, "Advanced microprocessor and Peripherals", Tata Mc-Graw Hill, 2/e, 2000.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning,2010

REFERENCE BOOKS:

1. Charles H.Roth, "Fundamentals of Logic Design", Thomas Publications, 5/e, 2004.
2. Zvi Kohavi, "Switching and Finite Automata Theory", Tata McGraw Hill, 2/e, 1978.
3. Ronald J. Tocci, Neal S. Widmer, "Digital Systems Principles and Applications", 8/e, Pearson Education, 2002.
4. Douglas V. Hall, "Micro Processors & Interfacing", Tata McGraw Hill, 2/e, 2007.
5. Walter A,Triebel, Avtar Singh, "The 8088 and 8086 microprocessors", Prentice Hall of India, 1/e, 2003.

REFERENCE WEBSITES:

1. https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm_ch2_dl.pdf
2. https://nptel.ac.in/courses/117/105/117105080/
3. https://nptel.ac.in/courses/108/103/108103157/

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	2	3	2	-	-	**-**	**-**	**-**	-	-	-
CO*	**3**	**2.6**	**2.3**	**2**	-	-	-	-	**-**	**-**	**-**	**-**

II B.Tech - III Semester

20CSM231	ADVANCED DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: A course on C and Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on different object-oriented programming concepts.
2. To develop skills to analyze the complexity of algorithms and to review Stack and Queue ADTs.
3. To enhance skill to work on non-linear data structures concepts and Hashing.
4. To learn about greedy, divide and conquer algorithms using relevant data structures.
5. To develop skill to apply different pattern matching algorithms and tries concepts.

UNIT –1: INTRODUCTION TO C++ (9)

Class & Objects- Class Members- Access Control- Constructors and Destructors- Inheritance Basics- Base and Derived Classes- Inheritance Types- Base Class Access Control- Polymorphism-Operator Overloading- Function Overloading- Runtime Polymorphism using Virtual Functions- Generic Programming- Function and Class Templates.

UNIT –2: INTRODUCTION TO ALGORITHMS & LINEAR DATA STRUCTURES (9)

Algorithm - Pseudo Code for Expressing Algorithms - Performance Analysis- Space Complexity - Time Complexity- Asymptotic Notation - Big Oh Notation - Omega Notation - Theta Notation and Little Oh Notation.

Stack ADT – Stack Operations - Implementation using Template Classes in C++ - Queue ADT – Queue Operations - Implementation using Template Classes in C++.

UNIT –3: NON LINEAR DATA STRUCTURES AND HASHING (9)

Trees: Binary Search Tree – Definitions & Operations-Implementation using C++ - AVL Trees – Definitions & Operations - B-Trees – Definitions & Operations.

Hash Functions: Collision Resolution - Separate Chaining- Open Addressing-Linear Probing - Quadratic Probing.

UNIT –4: DIVIDE AND CONQUER, GREEDY METHOD (9)

Divide and Conquer: General Method - Applications-Binary Search – Quick Sort - Merge Sort- Strassen"s Matrix Multiplication.

Greedy Method: General Method –Applications- Job Sequencing with Deadlines - Knapsack Problem - Minimum Cost Spanning Trees - Single Source Shortest Path Problem.

UNIT –5: PATTERN MATCHING ALGORITHMS AND TRIES (9)

Pattern Matching Algorithms: Brute Force Algorithm - Boyer Moore Algorithm –Knuth Morris Pratt Algorithm –Applications - Tries: Standard Tries - Compressed Tries - Suffix Tries – Applications.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Identify and apply the concepts of Object Oriented programming for real-world problems.	**PO1, PO2**
CO2	Analyze step by step and develop algorithms to solve real world problems, implement the data structures like Stack and Queue ADTs	**PO1, PO2, PO3**
CO3	Understand and apply the advanced trees concepts and appropriate hashing technique for solving real world problems.	**PO1, PO4, PO5**
CO4	Understand about greedy, divide and conquer algorithms using relevant data structures.	**PO1, PO2**
CO5	Recognize suitable pattern matching algorithms and Trie techniques for various applications.	**PO1, PO2, PO4**

TEXT BOOKS:

1. Wisnu Anggoro, "C++ Data Structures and Algorithms", Packt Publishing, 2018.
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Pearson Education Ltd., 4/e, New Delhi, 2014.

REFERENCE BOOKS:

1. Rajesh K. Shukla, "Data Structures Using C & C++", Wiley Publishing, 2019.
2. Ananda Rao Akepogu and Radhika Raju Palagiri, "Data structures and Algorithms using C++", 2/e, Pearson Education, 2012, New Delhi.
3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106127/

CO-PO MAPPING:

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

II B.Tech - III Semester

20CSE231	COMPUTER ORGANIZATION AND ARCHITECTURE (Common to CSE, CSM, CAI, CSD)	L T P C 3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To articulate design issues in the development of processor or other components that satisfy design requirements and objectives.
3. To study various data transfer techniques in digital computer and the design of control unit.
4. To learn the function of each element of a memory hierarchy and I/O devices.
5. To develop skill to apply the concept of Pipelining in designing multiprocessor system.

UNIT –1: BASIC STRUCTURE OF COMPUTERS (9)

Computer Types - Functional Units - Basic Operational Concepts - Bus Structures – Software – Performance - Multiprocessors and Multi Computers - Data Representation- Fixed Point Representation - Floating Point Representation - Error Detection Codes.

UNIT –2: CPU DESIGN AND COMPUTER ARITHMETIC (9)

CPU Design: Instruction Cycle - Memory Reference Instructions–Input/output and Interrupt -Addressing Modes - DATA Transfer and Manipulation - Program Control

Computer Arithmetic: Addition and Subtraction - Multiplication Algorithms - Division Algorithms -Floating Point Arithmetic Operations - Decimal Arithmetic Unit.

UNIT –3: REGISTER TRANSFER AND DESIGN OF CONTROLUNIT (9)

Register Transfer: Register Transfer Language - Register Transfer - Bus and Memory Transfers - Arithmetic Micro operations - Logic Micro Operations - Shift Micro Operations - Control Unit: Control Memory - Address Sequencing–Micro program Example - Design of Control Unit.

UNIT –4: MEMORY AND INPUT/OUTPUT ORGANIZATION (9)

Memory Organization: Memory Hierarchy–Main Memory–Auxiliary Memory–Associative Memory – Cache Memory – Virtual Memory - Input/output Organization: Input-Output Interface - Asynchronous data transfer - Modes of Transfer - Priority Interrupt - Direct memory Access.

UNIT –5: PIPELINE AND MULTIPROCESSOR (9)

Pipeline: Parallel Processing–Pipelining - Arithmetic Pipeline - Instruction Pipeline - Multiprocessor: Characteristics of Multiprocessors - Interconnection Structures–Inter processor Arbitration - Inter Processor Communication and Synchronization.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate the knowledge on fundamentals of organizational and architectural issues of a digital computer	**PO1, PO2**
CO2	Identify design issues in the development of processor or other components	**PO1, PO2, PO3, PO4**
CO3	Demonstrate control unit operations and conceptualize various data transfer operation among registers.	**PO1, PO3**
CO4	Categorize memory organization and explain the function of each element of a memory hierarchy and compare different methods for computer I/O mechanisms.	**PO1, PO3, PO5**
CO5	Understand and use the concept of Pipelining in various multiprocessor applications.	**PO1, PO4, PO5**

TEXT BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer Organization", 5/e,MCG,2002
2. M.Moris Mano, "Computer Systems Architecture" 3/e, PEA, 2007.

REFERENCE BOOKS:

1. John D. Carpinelli, "Computer Systems Organization and Architecture", PEA, 2009
2. William Stallings, "Computer Organization and Architecture", 6/e, Pearson/PHI.
3. Andrew S. Tanenbaum, "Structured Computer Organization", 4/e, PHI/Pearson.
4. Sivaraama Dandamudi, "Fundamentals or Computer Organization and Design", Springer Int. Edition.
5. John L. Hennessy and David A. Patterson, "Computer Architecture a quantitative approach", 4th Edition, Elsevier.
6. Joseph D. Dumas II, "Computer Architecture: Fundamentals and principles of Computer Design", BS Publication.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/103/106103180/
2. https://nptel.ac.in/courses/106/105/106105163/
3. https://nptel.ac.in/courses/106/106/106106166/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	3	-	-	-	-	-	-	-	-
CO3	3	-	2	-	-	-	-	-	-	-	-	-
CO4	3	-	3	-	3	-	-	-	-	-	-	-
CO5	2	-	-	2	2	-	-	-	-	-	-	-
CO*	**2.6**	**2.5**	**2.6**	**2.5**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.Tech - III Semester

20CSE233	PROGRAMMING WITH JAVA (Common to CSE, CSM, CAI, CSD)	L T P C 2 1 0 3

PRE-REQUISITES: A course on Advanced Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To study the syntax, semantics and features of Java Programming Language.
2. To understand the principles of inheritance and interfaces.
3. To develop Java application programs using exceptions and exploring packages.
4. To apply multithreading on problem solving and understand File handling.
5. To create GUI applications & perform event handling.

UNIT –1: BASICS OF JAVA (9)

History of Java - Java Buzzwords - Overview of Java - Data Types - Variables - Arrays - Operators - Control Statements – Introducing Classes &Objects - Constructors - Methods – Access Control -this Keyword - Garbage Collection -Overloading Methods and Constructors - Parameter Passing - Recursion – Reading input-Command Line Arguments – Buffer Reader – Scanner.

UNIT –2: STRING HANDLING, INHERITANCE AND INTERFACES (9)

String Handling: Constructors, length(), Special String Operations, Character Extraction, String Comparison – equals(), equalsIgnoreCase(), startsWith(), endsWith(), Deep Vs Shallow comparisons, String Buffer – constructors, length(), capacity(), reverse() and replace() - Inheritance-Basics of Inheritance-Using super-Creating a multilevel hierarchy-Method overriding- Dynamic method dispatch - Using abstract classes -Using final - Interfaces- Differences between Classes and Interfaces - Defining an Interface – Implementing Interface - Applying Interfaces - Variables in Interfaces and Extending Interfaces.

UNIT –3: PACKAGES AND EXCEPTION HANDLING (9)

Packages-Defining - Creating and Accessing a Package - Understanding CLASSPATH – Importing Packages - Exploring Packages - Exception Handling- Introduction – Exception Types – Uncaught Exception – Using Try and Catch – Multiple Catch clauses – Nested Try Statements – Throw – Throws – Finally – Built-in Exceptions – Creating Own Exception Subclass – Checked and Unchecked Exceptions.

UNIT –4: MULTITHREADING AND FILE HANDLING (9)

Multithreading -Differences between Multithreading and Multiprocessing - Thread Life Cycle - Creating Threads - Synchronizing Threads-Inter Thread Communication – wait(), notify(), notifyall() - File Handling: Reading and writing files.

UNIT –5: EVENT HANDLING AND SWINGS (9)

Event Handling and AWT - Delegation Event Model - Event Classes - Sources of Events - Event Listeners - Handling Mouse and Keyboard Events - Adapter Classes - Inner Classes - The AWT Class Hierarchy - Layout Managers - Swings - Limitations of AWT – Components - Containers - Exploring Swing - JApplet - JFrame and JComponent - JLabel and Imageicon –JTextfield - JButton - JCheck Box - JRadioButton - JCombobox - JTabbedpane - JScrollpane - JTable.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the basics of java programming	**PO1, PO2, PO3, PO4, PO5**
CO2	Develop Java programs with the concepts of inheritance and interfaces	**PO1, PO2, PO3, PO4, PO5**
CO3	Build Java applications using exceptions and packages	**PO1, PO2, PO3, PO4, PO5**
CO4	Applying multithreading concepts in problem solving and understand reading and writing of files	**PO1, PO2, PO3, PO5**
CO5	Develop the interactive Java programs using event handling and swings	**PO1, PO2, PO3, PO5**

TEXT BOOKS:

1. Herbert schildt, "Java; The complete reference", 7thedition, TMH.
2. Ivor Horton"s, "Beginning Java2 JDK", 5th edition, WILEY Dream Tech.

REFERENC BOOKS:

1. J.Nino and F.A. Hosch, "An Introduction to programming and OO design using Java",Johnwiley& sons.
2. T. Budd, "An Introduction to OOP", 2ndedition, Pearson education.
3. Y. Daniel Liang, "Introduction to Java programming", 6th edition, Pearson education.
4. R.A. Johnson,"An introduction to Java programming and object oriented application development,Thomson.
5. Cay.S.Horstmann and Gary Cornell, "Core Java 2, Fundamentals", Vol 1, 7th Edition, Pearson Education.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/106/105/106105191/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	3	2	3	3	-	-	-	-	-	-	-
CO4	3	3	2	-	3	-	-	-	-	-	-	-
CO5	3	3	2	-	3	-	-	-	-	-	-	-
CO*	**3**	**3**	**2.4**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.Tech - III Semester

20CSM232	WEB PROGRAMMING	L	T	P	C
		0	1	2	2

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Provide Knowledge on Fundamentals of HTML, CSS, XML and PHP.
2. To learn website development using Advanced HTML and XML concepts.
3. To identify suitable web scripting languages for efficient web page design.
4. To understand the complex web design techniques.
5. To identify the basic concepts of PHP.

UNIT –1: INTRODUCTION (6)

History of HTML, Fundamentals of HTML - Working with text, Organizing text in HTML - Working with links and URLs - Creating tables - Working with images – colors - Canvas and Forms - Interactive elements and Working with Multimedia.

Tasks:

1. a. Create a webpage with HTML describing your department. Use paragraph and list tags.
   b. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
2. Design a home page which will display your information, i.e. Bio data, using table.
3. Create a table to show your class time-table.
4. Create a HTML web page with the following:
   i) To embed an image map in a web page.
   ii) To fix the hot spots.
   iii) Show all the related information when the hot spots are clicked.
5. Create a LOGIN PAGE: Login page must contain Login field, Password field, Submit and reset buttons.
6. Create a "registration form "with the following fields 1) Name (Text field) 2) Password (password field) 3) E-mail id (text field) 4) Phone number (text field) 5) Gender (radio button) 6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil) 8) Address (text area).

UNIT –2: ADVANCED FEATURES OF HTML5 (6)

HTML Iframe - Creating editable content - Checking spelling mistakes - Exploring custom data attributes - Exploring Client-Side storage - Exploring Drag and drop feature.

Tasks:

1. Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "MCA" the catalogue for MCA Books should be displayed in the Right frame. Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.
2. To write a HTML Program to design the pages using canvas.
3. Create an interactive web page with Drag and Drop features of HTML.

UNIT –3: CSS (6)

Overview of CSS - Features of CSS3-Backgrounds and Color Gradients in CSS - Fonts and Text Styles - Displaying - Positioning and floating elements - Creating Boxes and Columns Using CSS: Exploring the Box Model - Exploring the Line Box Model.

Tasks:

1. a. To write a html program to create college website with various css styles like inline, embedded and external styles.
   b. Write a program to Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.
2. To write a CSS Program for displaying, positioning and floating an element.

UNIT 4: XML **(6)**

Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Tasks:

1. Write an XML file which will display the Book information which includes the following: 1) Ti tle of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price. Write a Document Type Definition (DTD) to validate the above XML file.
2. Design an XML document to store information about a student in a college affiliated to JUNTU. The information must include User id, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 10 students.

UNIT 5: PHP **(6)**

Introduction- Data types- Variables- Constants- Expressions- String interpolation- Control structures- Functions- Arrays- Embedding PHP code in web pages.

Tasks:

1. Write a program to validate the form using PHP regular expression.
2. Write a PHP Program to implement functions
   a. Create the functions f1(),f2(),f3() and f4() for addition, subtraction, Multiplication and Division of two numbers.
   b. Call the functions f1(),f2(),f3() and f4().
3. Write a PHP Program to implement the following concepts in Arrays.
   a. array_merge( ) used to merge two arrays.
   b. sort( ) used to sort the arrays in ascending order
   c. rsort( ) used to sort the arrays in descending order.

Total Hours: 30

COURSE OUTCOMES:

On successful completion of the course the student will be		**POs related to COs**
CO1	Understand the simple website design using HTML, CSS, XML and PHP.	**PO1**
CO2	Analyze and identify the appropriate webpage design techniques.	**PO2**
CO3	Design and develop efficient web page with HTML, CSS, XML and PHP.	**PO3**
CO4	Demonstrate simple web pages with various scripting languages.	**PO4**
CO5	Illustrate the complex programming concepts using different techniques.	**PO5**
CO6	Follow ethical principles in designing and implementation of various data structure algorithms	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiment	**PO10**
CO9	Continue updating their skill related to OOPs, trees and pattern matching algorithm	**PO12**

TEXT BOOKS:

1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How to Program", 5th Edition, Pearson Education, 2018.
2. Uttam K. Roy, "Web Technologies", Oxford Higher Education., 1st edition, 10th impression, 2015.

REFERENCE BOOKS:

1. Achyut Godbole, Atul Kahate, "Web Technologies", Third Edition, McGraw Hill Education (India) Private Limited, 2017.
2. Willard. Wendy, "Web design: A beginner's guide", second Edition, Mcgraw-hill, 2014.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.

REFERENCE WEBSITE:

1. https://www.geeksforgeeks.org/web-technology/
2. https://www.w3schools.com/

CO-PO MAPPING:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	3	**-**	**-**	**3**	**3**	**3**	**-**	3

II B.Tech –III Semester

20ESC238	**DIGITAL LOGIC DESIGN & MICROPROCESSORS LAB**	**L**	**T**	**P**	**C**
	(Common to CSE, CSM, CAI, CSD)	**0**	**0**	**3**	**1.5**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide practical knowledge on functions of digital ICs.
2. To analyze Boolean functions and verify logic gates.
3. To develop skill to understand arithmetic operations, concepts of Multiplexers.
4. To understand the basics of 8086 and 8051 microcontroller
5. To understand the Assembly language programming of 8086 and 8051.

LIST OF EXPERIMENTS:

Note: Minimum of 12 (8+4) experiments shall be conducted from both the sections given below:

DIGITAL ICS (MINIMUM '8' EXPERIMENTS):

1. Verify truth table of all the basic gates using IC-74XX.
2. Construct and verify the Universal gates.
3. Implement a given Boolean function of POS form and verify its function using logic gates.
4. Implement a given Boolean function of SOP form and verify its function using logic gates.
5. Verify the Demorgan"s theorem using logic gates.
6. Construct and prove the complement and dual of logic functions using basic gates.
7. Verify the functions of Half adder and Full adder using CMOS logic gates.
8. Verify the functions of Half Subtractor and Full Subtractor using CMOS logic gates.
9. Construct and check the outputs using multiplexer IC-74XX151 and Demultiplexer IC-74XX155.
10. Construct and verify the functions of a D FLIP-FLOP using IC-74XX74, shift register.

MICROPROCESSORS (MINIMUM '4' EXPERIMENTS):

1. Addition of two 16 bit numbers using 8086 Processor
2. Rotate operations using 8086 processor
3. Shift operations using 8086 processor
4. Conversion of Packed BCD to Unpacked BCD using 8086 processor
5. BCD to ASCII conversion using 8086 processor
6. ASCII operations using 8086 processor.

EQUIPMENTS AND COMPONENTS REQUIRED:

- 74xx series of logic gate ICs
- Digital ICs: 74XX74, 74XX95, 74XX138, 74XX148, 74XX151, 74XX155, 74XX138, 74XX138
- 5 Volt DC Power supply
- Digital multimeter/LEDs
- 8086 Microprocessor kits.

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Comprehend the operations of digital logic gates	**PO1**
CO2	Analyze the functioning performance of digital ICs	**PO2**
CO3	Gain the practical knowledge to design the circuits using digital integrated chips and Microprocessor.	**PO3**
CO4	Conduct investigation for analyzing the digital integrated circuits and microprocessor performance in various applications	**PO4**
CO5	Follow ethical principles in analyzing and design the circuits	**PO8**
CO6	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO7	Communicate verbally and in written form, the understandings about the circuits.	**PO10**
CO8	Continue updating their skill and apply during their life time.	**PO12**

REFERENCE BOOKS:

1. Morris Mano, "Digital Design", Prentice Hall of India, 3/e, 2006.
2. Thomas L.Floyd, "Digital Fundamentals", Pearson/Prentice Hall, 10/e, 2008.
3. A.K.Ray and K.M.Bhurchandi, "Advanced microprocessor and Peripherals", Tata Mc-Graw Hill, 2/e, 2000.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning,2010

REFERENCE WEBSITES:

1. https://www.csie.ntu.edu.tw/~pjcheng/course/asm2008/asm_ch2_dl.pdf
2. https://nptel.ac.in/courses/117/105/117105080/
3. https://nptel.ac.in/courses/108/103/108103157/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.Tech - III Semester

20CSM233 ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

L	T	P	C
0	0	3	1.5

PRE-REQUISITES: A course on C & Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge about the object oriented programming concepts
2. To inculcate skill to investigate the template concepts
3. To develop skill to implement the data structure concepts of stack and queue using array and linked list.
4. To provide knowledge to implement various trees and sorting methods using class template.
5. To develop and implement pattern matching algorithms and its applications.

List of Experiments:

1. Write a C++ Program to Illustrate the Following Concepts:
   a) Class. b) Constructors.
2. Develop a C++ Program to elaborate the Concept of Inheritance.
3. Develop a C++ Program to elaborate the Concept of Operator Overloading.
4. Develop a C++ Program to elaborate the Concept of Function Overloading.
5. Develop a C++ Program to explain the concept of Virtual Functions.
6. Write a C++ Program to Illustrate the Following Concepts:
   a) Function Templates b) Class Templates
7. Write a C++ Programs to Implement Stack ADT using An Array.
8. Write a C++ Programs to Implement the Queue ADT using An Array.
9. Write a C++ Programs that use Non-Recursive Functions to Traverse the given Binary Tree in a) Preorder b) Inorder c) Postorder
10. Develop a C++ Program to explain the concept Of Hashing.
11. Write a C++ Programs for Implementing the Following Sorting Methods:
    a) Merge Sort b) Heap Sort
12. Write a C++ program to find the solution for the knapsack problem using the greedy method.
13. Write a C++ Program for Implementing Knuth-Morris- Pratt Pattern Matching Algorithm.
14. Write a C++ Program for Implementing Boyer – Moore Patten Matching Algorithm.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the object oriented programming concepts	**PO1**
CO2	Identify and design the software using templates	**PO2**
CO3	Develop solutions for the complex engineering problems using data structure concepts like stack and queue	**PO3**
CO4	Implement the trees and sorting methods for different applications	**PO4**
CO5	Understand and identify the suitable pattern matching algorithm for solving complex problems	**PO5**
CO6	Follow ethical principles in designing and implementation of various data structure algorithms	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiment	**PO10**
CO9	Continue updating their skill related to OOPs, trees and pattern matching algorithm	**PO12**

REFERENCE BOOKS:

1. Wisnu Anggoro, "C++ Data Structures and Algorithms", Packt Publishing, 2018.
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Pearson Education Ltd., 4/e, New Delhi, 2014.
3. Rajesh K. Shukla, "Data Structures Using C & C++", Wiley Publishing, 2019.
4. Ananda Rao Akepogu and Radhika Raju Palagiri, "Data structures and Algorithms using C++", 2/e, Pearson Education, 2012, New Delhi.
5. C Programming Language (2nd Edition): Brian W. Kernighan, Dennis M. Ritchie: 0076092003106, 2015.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106127/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO6	-	-	-	-	-	-	-	3	-	-	-	-	3	2
CO7	-	-	-	-	-	-	-	-	3	-	-	-	3	2
CO8	-	-	-	-	-	-	-	-	-	3	-	-	3	2
CO9	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO*	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**	**3**	**2**

II B.Tech - III Semester

20CSE236	**PROGRAMMING WITH JAVA LAB** (Common to CSE, CSM, CAI, CSD)	**L T P C** **0 0 3 1.5**

PRE-REQUISITES: A course on Advanced Data Structures using C++

COURSE EDUCATIONAL OBJECTIVES:

1. To gain knowledge on object oriented programming concepts.
2. To develop the Java programs by using the concepts of inheritance and packages.
3. To design the variety of technologies and on different platforms.
4. To understand the concepts of event handling in Java platform.
5. To design the application using object oriented programming concepts.

List of Experiments:

1. Write a Java program
   a. To demonstrate the use of different data types in java
   b. To demonstrate the use of different types operators in java
   c. To demonstrate the scope and life time of variables.
2. Write a Java program
   a. To demonstrate the use of classes, objects and methods
   b. To demonstrate the use of constructors
3. Write a Java program
   a. To demonstrate the concept of method overloading
   b. To demonstrate the concept of constructor overloading (use this keyword)
4. Write a Java programs to read and write different types of data using
   a. Command line arguments
   b. Scanner class
5. a. Write a Java Program that Uses both Recursive and Non Recursive Functions to Print the N^{th} Fibonacci number.
   b. Write a Java Program that Prompts the User for an Integer and then Prints out all Prime Numbers up to that Integer.
6. a. Write a Java Program that Checks whether a Given String is a Palindrome or Not. Ex: MADAM is a Palindrome
   b. Write a Java Program for Sorting a Given List of Names in Ascending Order.
7. a. Write a Java Program for Multilevel Inheritance.
   b. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
8. a. Write a Java Program to create an abstract class Named Shape that contains an Empty Method namednumberOfSides().Provide three classes Named Trapezoid, Triangle andHexagon such that each one of the classes extends the class Shape. Each one of the classes Contains only the Method numberOfSides ( ) that Shows the Number of Sides in the Given Geometrical Figures.
   b. Write a Java Program Which includes class, abstract class and interface.
   c. Write a Java Program for Creation of User Defined Package and Accessing the Members Present in Package.
9. a. Write a Java Program for Checked and Unchecked Exceptions.
   b. Write a program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException.
   c. Use inheritance to create an exception super class called ExceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionCinherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catch es exception of type ExceptionB and ExceptionC.

10. a. Write a Java Program that creates three threads. First Thread displays "Good Morning" every one second, the Second Thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
    b. Write a Java Program that Correctly Implements Producer Consumer Problem using the Concept of Inter Thread Communication.
11. a. Write a java program that prints the contents of a given file. (use command line)
    b. Write a java program that copy one file in to another file. (use command line)
12. Develop an Applet that Receives an Integer in one Text Field, and Computes its Factorial Value and Returns it in Another Text Field, When The Button Named "Compute" is Clicked.
13. Write a java program that handles all mouse and key events and shows the event name at the center of the window when mouse event is fired (Use Adapter classes).
14. Write a Java Program that works as a Simple Calculator. Use a Grid Layout to Arrange Buttons for the Digits and for the +, -,*, % Operations. Add a Text Field to Display the Result.(Use SWINGS)

COURSE OUTCOMES:

On successful completion of the course the student will be		**POs related to COs**
CO1	Acquire the Knowledge on structure and model of the Java programming language.	**PO1**
CO2	Analyze the complex examples using java programming language.	**PO2**
CO3	Design solutions for user requirements using software functionality.	**PO3**
CO4	Investigate on event handling concepts in developing the object oriented programming	**PO4**
CO5	Develop the data base connectivity to the Java application	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. H.M.Dietel and P.J.Dietel, "Java How to Program", 6th edition, Pearson Education/PHI
2. Y.Daniel Liang, "Introduction to Java programming" 6thedition, Pearson Education
3. Cay Horstmann, "Big Java", 2ndedition, Wiley Student Edition, Wiley India Private Limited.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/106/105/106105191/

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.Tech - IV Semester

20BSC231	**NUMERICAL METHODS AND PROBABILITY THEORY (Common to All Branches)**	**L T P C** **3 1 0 4**

PRE-REQUISITES: A Course on Algebra & Calculus, Differential equations & Transform Techniques

COURSE EDUCATIONAL OBJECTIVES:

1. To develop skill to analyze appropriate method to find the root of the Algebraic and Transcendental Equations and to develop skill to apply the concept of interpolation for the Prediction of required values.
2. To learn the method of evaluation of numerical integration and to solve ordinary differential equations numerically using numerical methods.
3. To develop skill to analyze the discrete and continuous data.
4. To develop skill to analyze the discrete and continuous data using appropriate Statistical Distributions like Binomial, Poisson, Normal, etc and to inculcate skill to investigate different applications of statistical distributions and the corresponding conclusions required for the analysis of sample data.
5. To develop skill in testing of hypotheses and Tests of significance for small and large samples

UNIT –1: SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATIONS & INTERPOLATION (9)

Solution of Algebraic and Transcendental Equations: Introduction - The Bisection method - The method of False position - The Iteration method - Newton-Raphson method (Single Variable).

Interpolation: Introduction - Finite differences - Forward differences, Backward differences - Newton"s forward, Newton"s backward - Lagrange"s method of interpolation.

UNIT–2: NUMERICAL INTEGRATION AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (9)

Numerical integration: Trapezoidal rule - Simpson"s 1/3 Rule - Simpson"s 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor"s series - Picard"s method of successive approximations - Euler"s method - Runge-Kutta methods.

UNIT –3: PROBABILITY, RANDOM VARIABLES (9)

Probability: Sample space and events - Probability - The axioms of probability - Some elementary theorems - Conditional probability - Baye"s theorem.

Random variables: Discrete and continuous distributions – Statistical Parameters (Mean, Variance and Standard Deviation) of distribution functions.

UNIT -4: PROBABILITY DISTRIBUTIONS & SAMPLING THEORY (9)

Binomial - Poisson and Normal distributions - Related properties.

Sampling distribution: Populations and samples - Sampling distributions of mean (σ: known and unknown) - Proportions - Sums and differences.

UNIT -5: TEST OF HYPOTHESIS AND TEST OF SIGNIFICANCE (9)

Test of Hypothesis: Means - Hypothesis concerning one and two means - Type I and Type II errors - One tail, two-tail tests.

Test of Significance: Student"s t-test - F-test - Chi-square test of goodness of fit.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate knowledge in solving algebraic and transcendental equations by various mathematical methods and Design novel mathematical methods for constructing the interpolating polynomials to the given data	**PO1,PO2**
CO2	Demonstrate knowledge in finding the numerical values to integrals through different mathematical methods and solving ordinary differential equations numerically through various methods and Design novel mathematical methods for solving the ordinary differential	**PO1,PO2**
CO3	Demonstrate knowledge on use the probability and Random Variables in the field of engineering	**PO1,PO2,PO3**
CO4	Demonstrate knowledge in probability distributions and develop analytical skills for the problems involving means, probability distributions and standard deviations sampling techniques for decision making in uncertain environments	**PO1,PO2,PO3**
CO5	Demonstrate knowledge in testing of hypotheses and Tests of significance for small and large samples and Develop skills for analyzing the data with suitable tests of significance for practical situations through probability distributions	**PO1,PO2,PO3,PO4**

TEXT BOOKS:

1. S.C. Gupta, V.K. Kapoor, "Fundamentals of Mathematical Statistics", 10/e, S. Chand and Company Publishers, New Delhi, 2001.
2. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , "Probability and Statistics", S. Chand and Company Publishers, New Delhi, 2012.

REFERENCE BOOKS:

1. V. Ravindranath, T.S.R. Murthy,"Probability and Statistics, I.K. International Pvt. Ltd, New Delhi, 2011.
2. Johnson A. Richard, Miler & Fruends,"Probability and Statistics for Engineers", 6/e, Pearson Education, New Delhi, 2006.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", 34/e, Khanna Publishers, Delhi, 1999.
4. Dr. J. Ravichandran, "Probability and Statistics for Engineers", Wiley-India Publishers, New Delhi, 2011.
5. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability and Statistics for Engineers and Scientists", 7/e, Pearson Education Asia, New Delhi, 2002.

REFERENCE WEBSITES:

1. https://www.youtube.com/watch?v=hizXlwJO1Ck
2. https://www.youtube.com/watch?v=5817fLmsTGE
3. https://www.youtube.com/watch?v=yv6i9plC9nk
4. https://www.youtube.com/watch?v=r1sLCDA-kNY&list=PL46B9EA2CFEB51241
5. https://www.youtube.com/watch?v=r1sLCDAkNY&list=PL46B9EA2CFEB51241&index=1
6. https://www.youtube.com/watch?v=HnvB8BCDQm0&list=PL46B9EA2CFEB51241&index=2

CO-PO MAPPING:

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

II B.Tech - IV Semester

20HSM241	PRINCIPLES OF MANAGEMENT	L T P C
		3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

UNIT –1: INTRODUCTION TO MANAGEMENT (9)

Definition of management – Science or Art – Manager Vs Entrepreneur – Types of managers – Managerial roles and skills – Levels of management – Functions of management – Principles of management and Scientific Management and its approaches – Corporate Social Responsibilities – Organization culture and Environment.

UNIT –2: PLANNING AND DECISION MAKING (9)

Planning: Nature and purpose of planning – Planning process – Types of planning –Objectives – Setting objectives – Policies – Planning premises – Strategic Management – Planning Tools and Techniques **Decision Making**: Importance of decision making – – Decision making steps and process.

UNIT –3: ORGANIZING AND DIRECTING (9)

Organizing: Nature and purpose – Formal and informal organization – Organization chart and structure – Line and staff authority – Departmentalization – Delegation of authority – Centralization and decentralization – Job Design – HR planning, recruitment, selection, training and development, performance management, career planning and management. **Directing:** Principles of directing – Process of communication – Barrier in communication – Effective communication.

UNIT –4: CONTROLLING AND CO-ORDINATING (9)

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

UNIT –5: MODERN CONCEPTS OF MANAGEMENT (9)

Concept, features, merits and demerits of SWOT Analysis, Business Process Re-engineering, Supply Chain Management – Concepts, functions importance of marketing – Competitive analysis and advantages of E-marketing.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the concepts of management, roles to be adopted by manager, functions of manager and inculcating the social responsibility towards different stake holders.	**PO1, PO11**
CO2	Demonstrate knowledge with regard to planning, planning process and the process of making effective decisions.	**PO1, PO11**
CO3	Demonstrate knowledge about organizational environment, the process of staffing and the application of directive principles.	**PO1, PO11**
CO4	Demonstrate knowledge about controlling and Co-ordinating	**PO1, PO11**
CO5	Demonstrate knowledge about modern concepts in management.	**PO1, PO11**

TEXT BOOKS:

1. Besterfield Dale H, Besterfield Carol, Besterfield Glen H, Besterfield Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi, "Total Quality Management", 5/e, Pearson Education, New Delhi, 2018.
2. M. Govindarajan and S. Natarajan, "Principles of Management", Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Stephen P. Robbins and Mary Coulter, "Management", 8/e, Prentice Hall of India.
2. Charles W.L Hill, Steven L McShane, "Principles of Management", McGraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum and Jackson, "Management-A Competency Based Approach", 10/e, Thomson South Western, 2007.
4. Harold Koontz, Heinz Weihrich and mark V Cannice, "Management - A global and Entrepreneurial Perspective", 12/e, Tata McGraw Hill, 2007.
5. Andrew J. Dubrin, "Essentials of Management", Thomson South western. 7/e, 2007.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/110/105/110105146/

CO-PO MAPPING:

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

II B.Tech - IV Semester

20CSM241 ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES

L	T	P	C
3	0	0	3

PRE-REQUISITES: A course on Algebra and Calculus

COURSE EDUCATIONAL OBJECTIVES:

1. To provide basic knowledge about artificial intelligence.
2. To understand various searching techniques for problem solving.
3. To understand the knowledge, reasoning and planning involved in artificial intelligence.
4. To explore about reinforcement learning and natural language processing.
5. To understand natural language for communication and robotics.

UNIT –1: INTRODUCTION (9)

Introduction: Definition of AI, Foundations of AI, History of AI, The State of Art.
Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, Structure of Agents.

UNIT –2: PROBLEM SOLVING (9)

Solving problems by searching: Problem solving agents, Searching for solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions.
Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.
Game playing: mini-max algorithm, Alpha-Beta Pruning.

UNIT –3: KNOWLEDGE, REASONING, AND PLANNING (9)

Knowledge-Based Agents, Wumpus World, Logic, Syntax and Semantics of First-Order Logic, Forward chaining and backward chaining.
Classical Planning: Definition, Algorithms for Planning as State-Space Search, Planning Graphs.

UNIT –4: REINFORCEMENT LEARNING & NATURAL LANGUAGE PROCESSING (9)

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL.
Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

UNIT –5: NATURAL LANGUAGE FOR COMMUNICATION & ROBOTICS (9)

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition.
Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, Planning uncertain movements, Moving, Robotic software architectures, application domains.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the basics about artificial intelligence.	**PO1, PO2**
CO2	Identify the searching technique for problem solving.	**PO1, PO2**
CO3	Apply knowledge, reasoning and planning for solving real-world problems.	**PO1,PO2, PO3,PO4,PO5**
CO4	Understand reinforcement learning and natural language processing.	**PO1, PO2**
CO5	Understand the robotics concept.	**PO1, PO2, PO4**

TEXT BOOKS:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4th Edition, Pearson Education, 2020.
2. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing, 2017.

REFERENCES:

1. Stephen Lucci, Danny Kopec, "Artificial Intelligence in the 21st Century", Mercury Learning and Information, 3rd Edition, 2018.
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill, 2017.

REFERENCE WEBSITES:

1. http://peterindia.net/AILinks.html
2. https://nptel.ac.in/courses/106/102/106102220/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	2	-	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.Tech - IV Semester

20CSE241	DATABASE MANAGEMENT SYSTEMS (Common to CSE, CSM, CAI, CSD)	L T P C 3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Discuss the basic database concepts, applications, data models, schemas and instances and design Entity Relationship (E-R) model for a database.
2. Demonstrate the use of integrity constraints, relational algebra operations and relational calculus.
3. Describe the basics of SQL, construct queries using SQL, SQL functions, trigger and cursor concepts in PL/SQL.
4. Understand reasoning about functional dependency and to make the students to identify the role of normalization in database management systems.
5. To present the students with the knowledge of Transaction, concurrency and recovery strategies of DBMS

UNIT –1: DATABASE SYSTEMS AND ENTITY RELATIONSHIP MODELING (9)

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Users and Administrators - Various Components of overall Database System Structure- Data Models-The Entity-Relationship Model - Attributes and Entity Sets - Relationship Sets - Entity-Relationship Diagrams.

UNIT –2: RELATIONAL DATA MODEL (9)

Introduction to the Relational Model - Integrity Constraints -Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries- Tuple Relational Calculus - Domain Relational Calculus-Expressive power of algebra and calculus.

UNIT –3: INTRODUCTIONS TO SQL (9)

Structured Query Language (SQL): Introduction to SQL, Data types, Data Definition language commands, Data Manipulation language Commands and Data control Language Commands, Candidate Key, Primary key, Foreign key, Select Clause, Where Clause, Logical Connectivity"s – AND, OR, Range Search, Pattern Matching, Order By, Group By, Set Operations – Union, Intersect and Minus, Aggregate Functions, Join Operations. **PL/SQL:** Control Structures, functions, Triggers and Cursors.

UNIT –4: NORMALIZATION (9)

Introduction to Schema Refinement - Properties of Decompositions – Functional Dependencies – Attribute closure - Normal Forms - First - Second - Third – BCNF - Basic definitions of MVDs and JDs, Fourth and Fifth normal forms.

UNIT –5: TRANSACTION PROCESSING CONCEPTS AND CONCURRENCY CONTROL TECHNIQUES (9)

Transaction Concept - Transaction States - Implementation of Atomicity and Durability - Serializability - Recoverability - Concurrent Executions **-** Lock-Based Protocols for Concurrency Control - Time Stamp-Based Protocol for Concurrency Control - Multiple Granularity Recovery System: Recovery and Atomicity – Log based Recovery – Recovery with Concurrent Transactions.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate knowledge on Data models and Database Languages and Design Entity Relationship model for a database	**PO1, PO3**
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries.	**PO1, PO2**
CO3	Analyze and evaluate the databases using SQL DML/DDL Commands	**PO1, PO2, PO3, PO5**
CO4	Analyze databases using normal forms to provide solutions for real time applications.	**PO1, PO2**
CO5	Understand the properties of transactions in a database system, Analyze concurrency control techniques for handling concurrent transactions and understand recovery of data from failures	**PO1, PO3,PO4**

TEXT BOOKS:

1. Henry F. Korth, Silberchatz, Sudarshan, "Database System Concepts", 7/e, Tata McGraw-Hill, New York, 2019.
2. Raghu Rama Krishnan, "Database Management System", 2/e, Tata McGraw Hill, New York, 2000.

REFERENCE BOOKS:

1. Elmasri and Navathe, "Fundamentals of Database Systems", 5/e, Pearson Education, USA, 2008.
2. Peter Rob, A. Ananda Rao and Carlos Coronel, "Database Management Systems", 5/e, Cengage Learning, USA, 2003.
3. Ivan Bayross, "SQL, PL/SQL Programming", 2/e, BPB Publications, New Delhi, India, 2011.
4. C.J. Date, "Introduction to Database Systems", 8/e, Pearson Education, USA, 2004.
5. M.L. Gillenson, "Fundamentals of Database Management Systems", 1/e, Wiley, New Delhi, India, 2006.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/106/106106220/
2. https://nptel.ac.in/courses/106/105/106105175/

CO-PO MAPPING:

CO-/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	-	2	3	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2.6**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.Tech - IV Semester

20CSE242	OPERATING SYSTEMS	L T P C
	(Common to CSE, CSM, CAI, CSD)	3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand main components of OS, System structures and the operations performed by OS as a resource manager.
2. To Study process concurrency and synchronization.
3. To analyze the different memory management techniques.
4. To gain knowledge about concepts of input/ output systems and storage management.
5. To manage different file systems, protection and security to the systems

UNIT –1: OPERATING SYSTEMS OVERVIEW (9)

Introduction - What Operating system do - Operating system operations - Process management - Memory management - Storage management - Protection and Security - Distributed Systems - Special purpose systems - System structures: Operating system services - user operating system interface - System calls - Types of system calls - Operating system design and implementation - Operating system structure - Operating system generation - System boot.

UNIT –2: PROCESS MANAGEMENT AND CONCURRENCY (9)

Process Management: Process concepts – threads - scheduling-criteria – algorithms and their evaluation - Thread scheduling - Concurrency: Process synchronization - the critical- section problem - Peterson's Solution - synchronization Hardware – semaphores - classic problems of synchronization - monitors.

UNIT –3: PRINCIPLES OF DEADLOCK AND MASS-STORAGE STRUCTURE & I/O SYSTEMS (9)

Principles of deadlock - system model - deadlock characterization - deadlock prevention - detection and avoidance - recovery form deadlock. Mass-storage structure - overview of Mass – storage structure - Disk structure - disk attachment - disk scheduling - swap-space management - RAID structure - stable-storage implementation - Tertiary storage structure.

UNIT –4: MEMORY MANAGEMENT (8)

Memory Management and Virtual Memory :Logical & physical Address Space – Swapping - Contiguous Allocation – Paging - Structure of Page Table – Segmentation - Virtual Memory - Demand Paging - Performance of Demanding Paging - Page Replacement - Page Replacement Algorithms - Allocation of Frames - Thrashing.

UNIT –5: FILE SYSTEM INTERFACE (10)

File system Interface- the concept of a file - Access Methods - Directory structure - File system mounting - file sharing – protection - File System implementation - File system structure - file system implementation - directory implementation - allocation methods - free-space management - efficiency and performance - Protection and Security - Goals of protection - Principles of protection - Access matrix - The security problem - program threats - System and network threats, Language-Based Protection, Capability-Based Systems, The Security Problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to Cos
CO1	Analyze operating system operations, system design and implementation.	**PO1, PO2, PO5**
CO2	Implement Thread scheduling, solutions to synchronize problems.	**PO1, PO4, PO5**
CO3	Apply memory management techniques, virtual memory concepts.	**PO1,PO3,PO4, PO5**
CO4	Manage process execution without deadlock, mass storage structure.	**PO1,PO4, PO5**
CO5	Understand file system interface, protection and security in System and Network.	**PO1, PO2, PO4, PO5**

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", 9thEdition, Wiley Student Edition, April 2013.
2. W. Stallings, "Operating systems - Internals and Design Principles", 6th edition, Pearson, 2009.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, "Modern Operating Systems", 3rdedition, PHI,2015.
2. D. M. Dhamdhere, "Operating Systems A concept - based Approach", 2nd edition, TMH, 2017.
3. B. L. Stuart, "Principles of Operating Systems", Cengage learning, India Edition, 2008.
4. A. S. Godbole, "Operating Systems", 2nd edition, TMH, 2020.
5. S, Haldar and A. A. Arvind, "Operating Systems", Pearson Education, 2014.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/102/106102132/
2. https://nptel.ac.in/courses/106/108/106108101/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	2	-	-	3	3	-	-	-	-	-	-	-
CO3	3	-	3	3	3	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	-	-	-	-	-	-
CO5	2	3	-	3	3	-	-	-	-	-	-	-
CO*	**2.6**	**3**	**3**	**3**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.Tech - IV Semester

20CSE244	DATA ANALYTICS USING R	L T P C
	(Common to CSE, CSM, CAI, CSD)	0 1 2 2

PRE-REQUISITES: A course on Programming with Python

COURSE EDUCATIONAL OBJECTIVES:

1. How to manipulate data within R
2. To create simple graphs and charts used in introductory statistics
3. The given data using different distribution functions in R.
4. The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.
5. The relevance and importance of the theory in solving practical problems in the real world.

UNIT 1: INTRODUCTION **(6)**

Introducing to R-Environment Setup-Data Types-Variables-Operators-Decision Making-Loops-Functions-Strings-Vectors-Lists.

Tasks:

1. Study of basic Syntaxes in R.
2. Implementation of vector data objects operations.
3. Study and implementation of If else control structures in R.
4. Study and implementation of loop control structures.

UNIT 2: DATA INTERFACES **(6)**

Matrices-Arrays-Factors-Data Frames-Packages - Import and Export data with :CSV Files-Excel Files-XML Files-JSON Files-Web Data-Database

Tasks:

1. Implementation of matrix, array and factors and perform via in R.
2. Implementation and use of data frames in R.
3. Data Manipulation with data table package.
4. Import and export data from csv files.
5. Import and export data from excel files.

UNIT 3: STATISTICS **(6)**

Mean, Median & Mode-Linear Regression-Multiple Regression-Logistic Regression-Normal Distribution-Binomial Distribution-Poisson Regression-Analysis of Covariance-Time Series Analysis-Nonlinear Least Square

Tasks:

1. Demonstrate the different types of regressions.

UNIT 4: DATA VISUALIZATION **(6)**

R Charts & Graphs-Pie Charts-Bar Charts-Boxplots-Histograms-Line Graphs- Scatterplots

Tasks:

1. Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.
2. Study and implementation of Data Visualization with ggplot2.

UNIT 5: CLASSIFICATION **(6)**

Decision Tree-Random Forest-Survival Analysis-Chi Square Tests

Tasks:

1. Implementation of classification with decision tree in R.
2. Demonstration on a Statistical Model for Linear Relationship
   a. Least Squares Estimates
   b. The R Function lm
   c. Scrutinizing the Residuals

Total Hours: 30

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Install and use R for simple programming tasks.	**PO1, PO2**
CO2	Extend the functionality of R by using add-on packages	**PO1, PO3**
CO3	Extract data from files and other sources and perform various data manipulation tasks on them	**PO1, PO4**
CO4	Explore statistical functions and Tables to visualize results of various statistical operations on data in R	**PO1, PO4**
CO5	Apply the knowledge of R gained to data Analytics for real-life applications	**PO1, PO2, PO4**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to data analysis concepts and implementing programs in future.	**PO12**

TEXT BOOKS:

1. The Art of R Programming: A Tour of Statistical Software Design,Norman Matloff, No Starch Press, 2011
2. R for Everyone: Advanced Analytics and Graphics,Jared P. Lander,Addison-Wesley Data & Analytics Series, 2013.

REFERENCE BOOKS:

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017.

REFERENCE WEBSITE:

1. www.oikostat.ch
2. https://learningstatisticswithr.com/
3. https://www.coursera.org/learn/probability-intro#syllabus
4. https://www.isibang.ac.in/~athreya/psweur/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	1	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**1**	**-**	**3**	**3**	**3**	**-**	**3**

II B.Tech - IV Semester

20CSM242 ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES LAB L T P C
0 0 3 1.5

PRE-REQUISITES: A course on Programming with Python

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the methods for implementing algorithms using artificial intelligence techniques.
2. To explore different algorithms for solving real-world problems.
3. To practice and implement various local search algorithms.
4. To understand different informed search strategies.
5. To learn the robotics concepts.

List of Experiments:

1. Write a Program to Implement Breadth First Search.
2. Write a Program to Implement Depth First Search.
3. Write a Program to Implement 8-Puzzle problem.
4. Write a Program to Implement Water-Jug problem.
5. Write a Program to find the solution for Wumpus world problem.
6. Write a Program to Implement Simulated Annealing algorithm.
7. Write a Program to Implement Travelling Salesman Problem using Python.
8. Write a Program to Implement A* Algorithm.
9. Write a Program to Implement Hill Climbing Algorithm.
10. Write a Program to Implement text analysis using NLTK.
11. Develop a robotic simulation using VEX.

COURSE OUTCOMES:

On successful completion of the course the student will be		**POs related to COs**
CO1	Understand the different searching algorithms for solving problems.	**PO1**
CO2	Analyze and identify the problem solving techniques.	**PO2**
CO3	Design and develop various algorithms for solving real world problems	**PO3**
CO4	Understand and demonstrate various local search algorithms.	**PO4**
CO5	Understand the robot functions through simulation.	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4th Edition, Pearson Education, 2020.
2. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing, 2017.
3. Stephen Lucci, Danny Kopec, "Artificial Intelligence in the 21st Century", Mercury Learning and Information, 3rd Edition, 2018.
4. John Hunt, "A Beginners Guide to Python 3 Programming", Springer, 2020.

REFERENCE WEBSITES:

1. https://www.tensorflow.org/
2. https://github.com/pytorch
3. https://keras.io/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	2	-	-	-	-	-	-	-	-	-	3	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	2
CO5	-	-	-	-	2	-	-	-	-	-	-	-	3	2
CO6	-	-	-	-	-	-	-	3	-	-	-	-	3	2
CO7	-	-	-	-	-	-	-	-	3	-	-	-	3	2
CO8	-	-	-	-	-	-	-	-	-	3	-	-	3	2
CO9	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO*	**3**	**3**	**2**	**3**	**2**	**-**	**-**	**3**	**3**	**3**	**-**	**3**	**3**	**2**

II B.Tech - IV Semester

20CSE245	DATABASE MANAGEMENT SYSTEMS LAB (Common to CSE, CSM, CAI, CSD)	L T P C 0 0 3 1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data and Analyze and evaluate the databases using SQL DML/DDL commands.
2. Write SQL Queries to implement a Database Schema for the given Database.
3. Design Simple Database using a Tool and Implement it using SQL.
4. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.
5. Programming PL/SQL including procedures, functions, cursors and triggers.

The Following Topics need to be covered in the Laboratory Sessions:

SQL

Introduction to SQL:
DDL - DML Commands- Basic Data Types- Commands to Create Table- Constraint Definition Commands for Table Handling- Alter Table – Drop Table- Insert - Update – Delete Commands for Record Handling- Select with Operators like Arithmetic - Comparison - Logical Query Expression Operators - Ordering the Records with Order by- Grouping the Records.

SQL Functions:
Date - Numeric - Character – Conversion Functions - Group Functions: avg - max - min - sum -count
Set Operations: Union – Union all - Intersect - Minus
Join concept: Simple - Equi – Nonequi Join - Self –Outer join
Query&Sub queries- View Introduction - Create - Update - and Drop Commands

PL/SQL
Advantages of PL/SQL- Support of SQL - Executing PL/SQL- PL/SQL Character Set & Data Types- Character - Row - rowid - Boolean - Binary integer - Number Variable - Constant
Control structures: Condition–if- Interactive-loop - for – while- Sequential–go to.

Database Triggers
Definition - Syntax - Parts of Triggers- Types of Triggers - Enabling and Disabling Triggers-Cursors - Procedures and Functions- Definition and Implementation.

Note: The Faculty Members are instructed to provide the Necessary Exercises which covers the above Topics.

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.	**PO1**
CO2	Analyze the database schemas for the different types of database	**PO2**
CO3	Design the databases using SQL DML/DDL Commands	**PO3**
CO4	Design the complex PL/SQL programs for different problems	**PO4**
CO5	Use the procedure, function, trigger and cursor concepts in PL/SQL	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to SQL Commands and Queries and implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. Ivan Bayross, "SQL, PL/SQL Programming", 2/e, BPB Publications, New Delhi, India, 2011.
2. Satish Ansari, "Oracle Database 11g: Hands-on SQL and PL/SQL", PHI Publishers, 2010.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/106/106/106106220/
2. https://nptel.ac.in/courses/106/105/106105175/
3. https://www.tutorialspoint.com/plsql/index.htm

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.Tech - IV Semester

20CSE246	OPERATING SYSTEMS LAB (Common to CSE, CSM, CAI, CSD)	L T P C 0 0 3 1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge about practical experience with designing and implementing concepts of operating systems.
2. To analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
3. To develop skill to implement the file allocation and organization techniques.
4. To Understand and Implement Deadlock management techniques.
5. To provide knowledge to implement memory management schemes and page replacement schemes.

List of Experiments:

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF
2. Simulate the following CPU scheduling algorithms
   a) FCFS b) Priority
3. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
4. Simulate MVT and MFT.
5. Simulate the following File Organization Techniques
   a) Single level directory b) Two level
6. Simulate the following File Organization Techniques
   a) Hierarchical b) DAG
7. Simulate Bankers Algorithm for Dead Lock Avoidance.
8. Simulate Bankers Algorithm for Dead Lock Prevention.
9. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU Etc. …
10. Simulate Paging Technique of memory management
11. Write a C program to stimulate the following contiguous memory allocation techniques
    a) Worst-fit b) Best fit c) First fit
12. Write a C program to stimulate the disk scheduling algorithms.
    a) FCFS b) SCAN c) C-SCAN
13. Write a C program to simulate optimal page replacement algorithms
14. Write a C program to simulate the concept of Dining-Philosophers problem

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority	**PO1, PO2, PO3, PO5**
CO2	Simulate file allocation techniques	**PO1, PO2, PO3, PO5, PO11**
CO3	Simulate file organization techniques	**PO2, PO3, PO5**
CO4	Implement Deadlock management techniques.	**PO2, PO4, PO5**
CO5	Implement memory management schemes	**PO1, PO2, PO5**
CO6	Implement disk scheduling algorithms	**PO1, PO2, PO5, PO8**
CO7	Simulate optimal page replacement algorithms	**PO1, PO2, PO5, PO9**
CO8	Simulate optimal page replacement algorithms	**PO1, PO2, PO5, PO10**
CO9	Simulate the concept of Dining-Philosophers problem	**PO1, PO2, PO5, PO12**

REFERENCE BOOKS:

1. Operating System Principles, 9th Edition, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley Student Edition, 2009.
2. Modern Operating Systems (3rd Edition): Andrew S. Tanenbaum: 9780136006633, Pearson, 2008.
3. C Programming Language (2nd Edition): Brian W. Kernighan, Dennis M. Ritchie: 0076092003106, 2015.
4. Operating Systems In Depth: Design and Programming by Thomas W. Doeppner, 2010.

REFERENCE WEBSITES:

1. https://onlinecourses.nptel.ac.in/noc21_cs44/preview
2. https://profile.iiita.ac.in/bibhas.ghoshal/teaching_os_lab.html

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.Tech - IV Semester

20MAC231	**ENVIRONMENTAL SCIENCE** (COMMON TO ALL BRANCHES)	**L T P C** **2 - - -**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To recognize nature of environmental studies and various renewable and nonrenewable resources.
2. To understand flow and bio-geo- chemical cycles and ecological pyramids.
3. To identify various causes of pollution and solid waste management and related preventive measures.
4. To evaluate and interpret the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. To understand the causes of population explosion, value education and welfare programmes.

UNIT – 1: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (6)

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. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources.

UNIT – 2: CONCEPT OF ECOSYSTEM AND BIODIVERSITY (6)
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: Introduction – Definition: genetic, species and ecosystem diversity-Biogeographical 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-wildlife conflicts. -Endangered and endemic species of India -Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
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UNIT –3: ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT (6)
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 – 4: SOCIAL ISSUES AND THE ENVIRONMENT (6)
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. -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 – 5: HUMAN POPULATION AND THE ENVIRONMENT (6)

Population growth: variation among nations-Population explosion – Family Welfare Programme-Environment and human health-Human Rights-Value Education-HIV/AIDS. Women and Child Welfare-Role of Information Technology in Environment and human Case Studies.

Total hours: 30

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO4	Understand concept of rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO5	Causes of population explosion, value education and welfare programmes.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**

TEXT BOOKS:

1. R. Rajagopalan," Environmental Studies", Oxford University Press.
2. Gilbert M. Masters and Wendell P. Ela.,"Environmental Engineering and science" PHI Learning Pvt. Ltd, 2008

REFERENCE BOOKS:

1. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses", University grants commission, 2/e,2013.
2. C.P.Kaushik and Anubhakaushik "Text book of environmental studies", New age International publishers, 4/e,2006.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/127/105/127105018/
2. https://nptel.ac.in/courses/113/104/113104061/
3. https://nptel.ac.in/courses/120/108/120108005/
4. https://nptel.ac.in/courses/120/108/120108002/

CO-PO MAPPING:

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

II	**B.Tech - IV Semester**	
-	**INTERNSHIP DURING SUMMER VACATION**	**L T P C** **0 0 0 0**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training industry.
2. The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.

SCHEME OF INDUSTRY INTERNSHIP:

1. Students are encouraged to go to Industrial Internship for at least 2-3 weeks during summer vacation and should be organized by the Head of the Department for every student.

III **B.Tech - V Semester**

20CSM351	**MACHINE LEARNING TECHNIQUE**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

PRE-REQUISITES: A course on Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To acquire knowledge on basic mathematics for machine learning.
2. To understand the modeling and evaluation of machine learning concepts.
3. To understand the various regression concepts.
4. To analyze the various classification algorithms and their methodologies.
5. To develop skill to apply various clustering algorithms in real-time applications.

UNIT -1: BASICS OF MACHINE LEARNING (9)

Human Learning- Types of Human Learning, Machine Learning- Types of learning-Supervised, Unsupervised, Reinforcement, Applications and challenges. Mathematical tools for Machine Learning- Review of Vectors and Matrices-Types of Matrices, Matrix Operations, Determinant of a Matrix, Inverse of a Matrix, Three fundamental spaces, Conditional Probability, Baye's Theorem.

UNIT -2: MODELLING AND EVALUATION & BASICS OF FEATURE ENGINEERING (9)

Data Preprocessing- Data Cleaning, Data Integration, Data Transformation, Data Reduction or Dimensionality Reduction. Selecting a Model, Training a Model, Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model. Basics of Feature Engineering-Feature Transformation, Feature Subset Selection.

UNIT -3: REGRESSION (9)

Introduction to Supervised Learning and Regression, Linear Regression, Evaluation of Model Estimators, Regularization-Ridge regression, LASSO regression, Multi Linear Regression, Gradient Based Methods. Cost function- Minimizing the Cost Function for a Single-Variable Function, Minimizing the Cost Function for a Two-Variable Function, Evaluation Metrics (Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Root Mean Squared Log Error (RMSLE), R Squared (R2), Adjusted R Squared)

UNIT -4: CLASSIFICATION (9)

Introduction to Classification, Logistic Regression-Building Logistic Regression Model (Logic Function), Maximum Likelihood Estimation. Decision Tree-Steps to Construct a Decision Tree, Classification Using Decision Trees, Issues in Decision Trees, Ensemble Learning-Random Forest. Bayesian Classification-Naive Bayes Classifier, k-Nearest Neighbor (KNN). Multilayer Perceptron (MLP), Support Vector Machines- Linear Support Vector Machines, Optimal Hyperplane, Radial Basis Functions, Evaluation Metrics (Accuracy, Confusion Matrix, Precision, Recall, F1 Score)

UNIT -5: CLUSTERING (9)

Introduction to Unsupervised Learning Algorithms, Clustering- Types of Clustering, Partitioning Methods of Clustering, Hierarchical Methods, K-means Clustering- Choosing number of Clusters. Principal Component Analysis (PCA).

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to Cos
CO1	Use knowledge on mathematics for machine learning.	**PO1, PO2**
CO2	Demonstrate the modeling and evaluation of machine learningconcepts.	**PO1, PO2, PO3**
CO3	Analyze various regression techniques.	**PO1, PO2**
CO4	Identify various classification algorithms and their methodologies	**PO1, PO2, PO3, PO5**
CO5	Understand and apply various clustering algorithms in real-timeapplications.	**PO1,PO2, PO3,PO4, PO5**

TEXT BOOKS:

1. Anuradha Srinivasaraghavan and Vincy Joseph, "Machine Learning", Wiley Publisher, 2019.
2. SaikatDutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", Pearson, 2019.
3. Alpaydin Ethem, "Introduction to Machine Learning", 3rd Edition, PHI learning privatelimited, 2019.

REFERENCES BOOKS:

1. Deisenroth, Marc Peter, A. Aldo Faisal, and Cheng Soon Ong, "Mathematics for machine learning", Cambridge: Cambridge University Press, 2019.
2. Marsland, Stephen, "Machine learning: an algorithmic perspective", Chapman and Hall/CRC, 2014.

REFERENCE WEBSITES:

1. https://www.deeplearning.ai/machine-learning- yearning/
2. https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	2	3	-	3	-	-	-	-	-	-	-
CO5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.2**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - V Semester

20CSE243	SOFTWARE ENGINEERING AND DESIGN	L	T	P	C
		2	1	0	3

PRE-REQUISITES: A course on Advanced Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge of basic software engineering methods, practices and their appropriate application.
2. To understand software requirements and the SRS documents.
3. To design components based on different software architectural styles and to Study the notations of Unified Modeling Language to identify, analyze, and model structural and behavioral concepts of the system.
4. To understanding of approaches to verification and validation including static analysis, andReviews.
5. To describe software measurement and software risks.

UNIT -1: INTRODUCTION TO SOFTWARE ENGINEERING AND PROCESS MODELS (9)

Introduction to Software Engineering: The evolving role of software, changing nature of software, Software myths - A Generic view of process: Software engineering- a layered technology, a process framework, the Capability maturity model integration (CMMI), process patterns, process assessment, personal and Team process models - Process models: The waterfall model, incremental process models, evolutionary process models, the Unified process.

UNIT -2: SOFTWARE REQUIREMENTS (9)

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document - Requirements engineering process: Feasibility studies, requirements elicitation and analysis, Requirements validation, requirements management - System models: Context models, behavioral models, data models, object models, structured methods.

UNIT -3: DESIGN ENGINEERING (9)

Design Engineering: Design process and design quality, design concepts, the design model - Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modelling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT -4: TESTING STRATEGIES (9)

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging-Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT -5: METRICS FOR PROCESS AND PRODUCTS (9)

Metrics for Process and Products: Software measurement, metrics for software quality - Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk Projection, risk refinement, RMMM, RMMM plan - Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Identify the key activities in managing a software project and can compare different process models.	**PO1, PO2**
CO2	Identify software requirements and design SRS document by analyzing the data flows.	**PO1, PO3, PO4**
CO3	Design class based components and conduct component level design based on architectural styles and patterns. Represent classes, responsibilities and states using UML notationand model structural concepts of the system. Model behavioral concepts of the system and analyze and document the requirements through use case driven approach	**PO1,PO2,PO3,PO4, PO5**
CO4	Identify various types of testing and development metrics for various phases of software development.	**PO1, PO2, PO4**
CO5	Identify the software risks and analyze the quality assurance activities	**PO1, PO4**

TEXT BOOKS:

1. Roger S Pressman, "Software Engineering, A practitioner's Approach", 8th edition, Tata McGraw Hill International Edition, 2019.
2. Somerville, "Software Engineering", 7th edition, Pearson Education, 2004.
3. Grady Booch, James Rambaugh, Ivar Jacobson, "The unified modeling language user guide", Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. JalotePankaj, "An integrated approach to Software Engineering", Narosa
4. Waman S Jawadekar, "Software Engineering: A Primer", First edition, Tata McGraw Hill, 2008.
5. Grady Booch, "Object- Oriented Analysis and Design with Applications", 2nd edition, Pearson Education, New Delhi, India, 2007.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/106/105/106105182/
2. http://peterindia.net/SoftwareDevelopment.html

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	3	3	-	-	-	-	-	-	-	-
CO3	2	2	3	2	3	-	-	-	-	-	-	-
CO4	2	2	-	3	-	-	-	-	-	-	-	-
CO5	3	-	-	2	-	-	-	-	-	-	-	-
CO*	**2.4**	**2**	**3**	**2.5**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - V Semester

20CAI351	AI FOR IMAGE ANALYSIS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To Study the basic concept of image formation and 3D imaging
2. Understand the Image Analysis concept like pixel processing, Feature Extraction and Segmentation
3. To study the Color space of an image and Scikit image
4. Understand the advanced image processing using open CV
5. To study the image processing using machine learning and real time use cases

UNIT-1: IMAGE FORMATION& 3-D IMAGING (9)

Introduction to Image Formation: Introduction, World and camera coordinates, Ideal Imaging: Perspective Projection, Real Imaging, Radiometry of Imaging, Liner System Theory of Imaging, Homogeneous Coordinates Introduction to 3-D Imaging: Basics, Depth from Triangulation, Depth from Time-of-Flight, Depth from Phase: Interferometry, Shape from Shading, Depth from Multiple Projections: Tomography

UNIT -2: IMAGE ANALYSIS (9)

Pixel processing- Homogeneous Point Operations- Inhomogeneous Point Operations- Multichannel Point Operations- Geometric Transformations- Interpolation-Feature Extraction- Box Filter -Binomial Filter -Filters as Networks- Efficient Large-Scale Averaging- Nonlinear Averaging - Image Analysis-Segmentation-Pixel based-Model based-Edge based-Region based-Morphology - Introduction-Neighborhood Operations on Binary Images - Composite Morphological Operators.

UNIT -3:COLOR SPACE AND SCIKIT IMAGE (9)

Color Spaces: RGB, XYZ, HSV/HSL, LAB, LCH, YPbPr, YUV, YIQ-Advanced Image Concepts- Bezire Curve, Ellipsoid, Gamma Correction, Structural Similarity Index, Deconvolution, Homography, Convolution- **Scikit Image-**Uploading and Viewing an Image, Getting Image Resolution, Looking at Pixel Values, Converting Color Space, Saving an Image, Creating Basic Drawings, Doing Gamma Correction. Rotating, Shifting, and Scaling Images, Determining Structural Similarity.

UNIT -4: ADVANCED IMAGE PROCESSING USING OPEN CV (9)

Blending Two Images, Changing Contrast and Brightness, Adding Text to Images, **Smoothing Images:** Median Filter, Gaussian Filter, Bilateral Filter. Changing the Shape of Images, Effecting Image Thresholding, Calculating Gradients, Performing Histogram Equalization.

UNIT -5: IMAGE PROCESSING USING MACHINE LEARNING & REAL TIME USE CASES (9)

Feature Mapping Using the SIFT Algorithm, Image Registration Using the RANSAC Algorithm: estimate_ affine, residual lengths, processing the Images, The Complete code. Image Classification Using Artificial Neural Networks, Image Classification Using CNNs, Image Classification Using Machine Learning Approaches: Decision Trees, Support Vector Machines, Logistics Regression, Code, Important Terms

Introduction to Real-Time Use Cases:

Finding Palm Lines, Detecting Faces, Recognizing Faces, Tracking Movements, Detecting Lanes

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand basic concept of image formation of 3D imaging	**PO1, PO2**
CO2	Acquire knowledge of Image Analysis	**PO1, PO2, PO3**
CO3	Identify various type of color space and how to upload the images	**PO1, PO2**
CO4	To study the advanced image processing using open CV	**PO1, PO2, PO3, PO5**
CO5	Analyze and Apply image processing using machine learning and real time use cases	**PO1,PO2,PO3, PO4, PO5**

TEXT BOOKS:

1. Digital Image Processing-Bernd Jahne, Springer, 5th edition,2005.
2. Practical Machine Learning and Image Processing by Himanshu Singh,2019.
3. Hands-On Image Processing with Python: Expert techniques for advanced image analysis and effective interpretation of image data, by Sandipan Dey, 2018.

REFERENCE BOOKS:

1. Digital Image Processing by Rafael C. Gonzalez,4th Edition, 2018.

ONLINE LEARNING RESOURCES:

1. How to Implement Artificial Intelligence for Solving Image Processing Tasks | Apriorit
2. Image Processing for Engineering and Science | Course

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	3	-	-	-	-	-	-	-
CO5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**2.8**	**2.6**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - V Semester

		L	T	P	C
20CAI352A	**FUNDAMENTAL OF AUTOMATA AND COMPILER DESIGN**	**3**	**0**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To construct Finite state Machines without and with outputs.
2. To construct Regular Expressions for the regular languages and equivalent FSMs.
3. To provide knowledge on different stages in the compilation process and identify different methods of lexical analysis.
4. To learn the use of intermediate code generation and runtime environments and implementation intermediate code generation.
5. To develop skill to apply the concept of optimization and develop algorithms to generate code for a target machine.

UNIT -1: FUNDAMENTALS AND FINITE AUTOMATA (9)

Strings - Alphabets and languages - Finite state systems – Basic Definitions - Finite Automata - Deterministic finite automata – Non deterministic finite automata - Equivalence of DFA and NFA - Equivalence of NFA with and without ε –moves - Minimization of FA - Finite automata with output – Moore machines and mealy machines.

UNIT -2: REGULAR EXPRESSIONS AND REGULAR SETS (9)

Regular expressions – Regular languages - Identity rules for regular expressions – Equivalence of Finite automata and regular expressions – Pumping lemma for regular sets – Applications of the Pumping lemma - Context Free Grammars - Derivations.

UNIT -3: INTRODUCTION TO COMPILER, LEXICAL ANALYSIS AND PARSING (9)

Introduction to Compiler - Phases of a compiler - Lexical Analysis: The Role of the Lexical Analyser - Input Buffering - Specification of Tokens.

Top Down Parsing-The Role of the Parser - Context free grammar - Eliminating Ambiguity - Eliminating of Left Recursion and Left Factoring -Recursive descent parsing - Non-Recursive Predictive parsing - LL (1) Grammars.

Bottom-Up Parsing: Shift reduce parsing - LR parsers - Simple LR parser - Canonical LR parser - LALR parser - The Parser Generator YACC

UNIT -4: INTERMEDIATE CODE GENERATOR AND RUN TIME ENVIRONMENTS (9)

Intermediate Code Generation: Intermediate Languages - Boolean expressions - Flow-of-Control Statements - Control- Flow Translation of Boolean Expressions - Run time Environments: Storage organization - Stack Allocation strategies - Symbol table structure - Symbol attributes and management.

UNIT -5: CODE OPTIMIZATION AND CODE GENERATION (9)

Code Optimization: Basic Blocks and Flow Graphs - Optimization of Basic Blocks - The principle sources of optimization - Introduction to data flow analysis, DAG - Code Generation: Issues in the Design of a Code Generator - The Target Language - A Simple Code Generator - Peephole optimization - Register allocation and assignment.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate knowledge on Automata Theory, Analyze and Design of finite automata, and prove equivalence of various finiteautomata	**PO1, PO2**
CO2	Demonstrate knowledge on Regular Expression, Analyze and design of regular expressions from regular languages, and prove the equivalence of languages described by finite state machines and regular expressions, applying pumping lemma on regular sets.	**PO1, PO2, PO3, PO4**
CO3	Demonstrate knowledge on fundamentals of compiler phases, Design the Lexical Analyzer and input buffering and design top down parse	**PO1, PO2**
CO4	Demonstrate the ability to write intermediate code for a given high level programming language (preferably C or FORTRAN)and be able to represent the intermediate code as Quadruples,Triples and Indirect Triples	**PO1, PO2, PO3, PO4**
CO5	Write three address code and identify the basic blocks, draw flow graphs and represent directed Acyclic graphs for the identified basic blocks. They will also be able to write the target optimized code (assembly code) for the given three address code.	**PO1,PO2,PO3, PO4, PO5**

TEXT BOOKS:

1. Hopcroft H.E. and Ullman Jeffrey.D., "Introduction to Automata theory languages and Computation", 3/e, 2006, Pearson Education, New Delhi, India.
2. Mishra K L P and Chandrasekaran N, "Theory of Computer Science - Automata, Languages and Computation", 2/e, 2007, PHI, New Delhi, India.
3. Alfred V. Aho - Monica S.Lam - Ravi Sethi - Jeffrey D. Ullman, "Compilers-Principles - Techniques and Tools", 2nd edition, Pearson Education, 2018.

REFERENCES BOOKS:

1. John C Martin, "Introduction to Languages and Theory of Computation", 1/e, 2009, Tata McGraw Hill Education, Hyderabad, India.
2. Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation", Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
3. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.
4. Alfred V. Aho - Monica S.Lam - Ravi Sethi - Jeffrey D. Ullman, "Compilers-Principles - Techniques and Tools", 2nd edition , Pearson Education, 2012.
5. Alfred V. Aho - Ravi Sethi - Jeffrey D. Ullman, "Compilers-Principles Techniques and Tools", Low price edition, Pearson Education, 2004.

REFERENCE WEBSITES:

1. www.youtube.com/watch?v=58N2N7zJGrQ
2. www.youtube.com/watch?v=14RLvkzbHFc
3. www.digimat.in/nptel/courses/video/106108113/L03.html

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-
CO3	3	3	3			-	-	-	-	-	-	-
CO4	3	3	3			-	-	-	-	-	-	-
CO5	3	3	3	2		-	-	-	-	-	-	-
CO*	**3**	**2.4**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - V Semester

20CAI352B	DISTRIBUTED DATABASE AND INFORMATION SYSTEMS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Database Management System

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the different types of an architecture in distributed relational database and query processing
2. Study the distributed security techniques and database recovery.
3. Determine the appropriate protocols for symmetric and asymmetric Cryptosystems
4. Defining the functions and components of Information system.
5. Illustrate the collaborative decision support system and tools for Business operations.

UNIT- 1: INTRODUCTION (9)

Data Fragmentation - Replication and allocation techniques for DDBMS - Methods for designing and implementing DDBMS - designing a distributed relational database - Architectures for DDBMS - Cluster federated - parallel databases and client server architecture - Overview of query processing.

UNIT- 2: DISTRIBUTED SECURITY (9)

Overview of security techniques - Cryptographic algorithms - Digital signatures – Distributed Concurrency Control – Serializability theory - Taxonomy of concurrency control mechanisms - Distributed deadlocks – Distributed Database Recovery - Distributed Data Security - Web data management - Database Interoperability.

UNIT- 3: ADVANCES IN DISTRIBUTED SYSTEMS (9)

Authentication in distributed systems - Protocols based on symmetric cryptosystems - Protocols based on asymmetric cryptosystems - Password-based authentication - Unstructured overlays – Chord distributed hash table - Content addressable networks (CAN) - Tapestry - Some other challenges in P2P system design – Trade offs between table storage and route lengths - Graph structures of complex networks - Internet graphs - Generalized random graph networks.

UNIT-4: FUNDAMENTALAS OF INFORMATION SYSTEMS (9)

Defining information – Classification of information – Presentation of information systems – Basics of Information systems – Functions of information systems – Components of Information systems Limitations of Information systems – Information System Design.

UNIT- 5: ENTERPRISE COLLOBRATION SYSTEMS (9)

Groupware – Types of groupware – Enterprise Communication tools – Enterprise Conferencing tools- Collaborative work management tools – Information System for Business operations – transaction processing systems – functional Information Systems – Decision Support systems – Executive Information systems – Online Analytical processing.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Describe the concepts of distributed relational database and query processing	**PO1, PO2**
CO2	Summarize distributed security techniques and database recovery.	**PO1, PO2, PO3, PO4**
CO3	Apply the appropriate protocols for symmetric and asymmetric Cryptosystems.	**PO1, PO2**
CO4	Analyze the functions and components of Information system.	**PO1, PO2, PO3, PO5**
CO5	Analyze the decision support system and tools for Business operations.	**PO1,PO2,PO3, PO4, PO5**

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education Asia, 2012.
2. Ajay D. Kshemkalyani, MukeshSinghal, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press, 2008.

REFERENCE BOOKS:

1. Distributed Databases - Principles and Systems; Stefano Ceri; Guiseppe Pelagatti; Tata McGraw Hill; 2006.
2. Ralph Stair and George Reynolds., "Principles of Information Systems" Course Technology, Inc.,2006.

REFERENCE WEBSITES:

1. www.youtube.com/watch?v=0_m5gPfzEYQ
2. www.youtube.com/watch?v=aUyqZxn12sY
3. www.youtube.com/playlist?list=PLyH7UFQzuDWdurTvaRxNY_21ZyoE476AG

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	2	3	-	3	-	-	-	-	-	-	-
CO5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - V Semester

20CAI352C	DATA VISUALIZATION TECHNIQUES	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the basic concept of visualization, data representation and tools
2. Recognize how to represent the various data method
3. Demonstrate how tools are used in visualizing the data
4. Sketch the interactive data visualization
5. Acquire the knowledge of security in data visualization

UNIT-1: INTRODUCTION (9)

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors-Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualizationtools.

UNIT-2: VISUALIZING DATA METHODS (9)

Mapping - Time series - Connections and correlations – Indicator-Area chart-Pivot table- Scatter charts, Scatter maps - Tree maps, Space filling and non-space filling methods-Hierarchies and Recursion - Networks and Graphs-Displaying Arbitrary Graphs-node link graph-Matrix representation for graphs- Info graphics

UNIT- 3: VISUALIZING DATA PROCESS (9)

Acquiring data, Find Data -Tools for Acquiring Data from the Internet- Locating Files for Use with Processing-Loading Text Data, Dealing with Files and Folders - Listing Files in a Folder-Asynchronous Image Downloads- Advanced Web Techniques-Using a Database-Dealing with a Large Number of Files. Parsing data - Levels of Effort,-Tools for Gathering Clues, Text Is Best- Text Markup Languages.

UNIT-4: INTERACTIVE DATA VISUALIZATION (9)

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geo mapping – Exporting, Framework – T3, tablo.

UNIT-5: SECURITY DATA VISUALIZATION (9)

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems – Creating security visualization system.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Explain the representation of complex and voluminous data	**PO1, PO2**
CO2	Identify and use various methodologies present in data visualization.	**PO1, PO2, PO3, PO4**
CO3	Apply various process and tools used for data visualization.	**PO1, PO2**
CO4	Use the layouts for the data	**PO1, PO2, PO3**
CO5	Analyze the process involved and security issues present in data visualization.	**PO1, PO2, PO3, PO5**

TEXT BOOKS:

1. Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures 1st Edition O'Reilly Media, Inc., 2019.
2. Scott Murray, "Interactive data visualization for the web", O'Reilly Media, Inc., 2013.
3. Ben Fry, "visualizing Data", O' Reilly Media, Inc, 2007.

REFERENCE BOOKS:

1. Greg Conti, "Security Data Visualization: Graphical Techniques for Network Analysis", NoStarch Press Inc, 2007.

REFERENCE WEBSITES:

1. https://www.udemy.com/topic/data-visualization/
2. https://www.youtube.com/watch?v=7kPqESo1vRw

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	1
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO5	2	3	2	-	-	-	-	-	-	-	-	-	2	1
CO*	**2.6**	**2.4**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**

III B.Tech - V Semester

20CAI353	ADVANCED WEB BASED PROGRAMMING	L	T	P	C
		0	1	2	2

PRE-REQUISITES: Web Programming

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the basic of Angular js model and view model.
2. Getting the knowledge functional components of React for Web Development.
3. Apply the package suitable for java script.
4. Identify the components, events, modules, and routing
5. Study different APIs and Server Rendering features for displaying information onto the screen.

UNIT-1: INTRODUCTION TO ANGULARJS (9)

Introduction-Development Environment Setup - Model-View-View-Model [MVVM]- Angular JS installation - Sharing Data with the View - Implementing Name Calculator - Custom HTML Attributes- Dependency Injection - Protecting Dependency Injection from Modification - Expressions and Interpolation.

UNIT-2: FILTERS, DIGEST CYCLE, CONTROLLER INHERITANCE AND CUSTOM SERVICES (9)

Filters - Creating Custom Filters - Digest Cycle - 2-way, 1-way and 1 time binding, ng-repeat, Filtered ng-repeat - Prototypal Inheritance - Scope Inheritance - Controller As Syntax - Custom Services - Custom Services with .factory() - Custom Services with .provider().

UNIT-3: PROMISES, AJAX AND CUSTOM DIRECTIVES (9)

Asynchronous Behaviour with Promises and $q - Ajax with $http Service - Ajax with $http Service - Directives: Dynamic HTML - Directives: Dynamic HTML - restrict Property - Directive's Isolate Scope: Using Controllers Inside Directives - Using Controllers Inside Directives - Directive APIs - Directive APIs - Manipulating the DOM with link - Manipulating the DOM with link- Using Directive's transude to Wrap Other Elements - Using Directive's transude to Wrap Other Elements.

UNIT- 4: COMPONENTS, EVENTS, MODULES, AND ROUTING (9)

Components & Component-Based Architecture – Angular JS Event System- Modules-Routing - Routing State with Controller- Routing State with resolve - Routing State with resolve- Routing State with URL Parameters - Routing State with URL Parameters- Routing State with Nested Views - Router State Transition Events.

UNIT- 5: FORM VALIDATION AND TESTING (9)

Form Validation-Testing Java script with Jasmine- Testing Angular JS Controllers-Testing Angular JS Services and $http- Testing Angular JS Directives- Testing Angular JS Components Testing Angular JS Components-Visit With The Client-Non-Angular JS Website Overview Restaurant Server Setup-Basic Structure of the Restaurant App - Coding Up a Loader/Spinner Coding Up $http Interceptor-Coding Up Menu Categories View -Single Category View.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Explain the intermediate and advanced web development practices in Java Script.	**PO1, PO2**
CO2	Identify the features and functional components of React for Web Development.	**PO1, PO2, PO3, PO4**
CO3	Find and use code packages of Node.js for creating cross platform JavaScript runtime environment.	**PO1, PO2**
CO4	Use the various component, modules for Angular js	**PO1, PO2, PO3, PO4**
CO5	Analyze different APIs and Server Rendering features for displaying information onto the screen.	**PO1, PO2, PO3, PO5**

TEXT BOOKS:

1. Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, APress Publisher, 2019.
2. Modern Full-stack Development, Frank Zammetti, Apress, 2020 .

REFERENCE BOOKS:

1. Advanced Web Development with React, Mehul Mohan, bpb publisher, 2020.
2. Dayley B. Node. js, MongoDB, and AngularJS web development. Addison-Wesley Professional; 2014.
3. Freeman, Adam. Pro AngularJS. Apress, 2014.

WEB REFERENCES:

1. https://in.coursera.org/learn/single-page-web-apps-with-angularjs
2. http://tutorialsteacher.com
3. https://reactjs.org/
4. https://nodejs.org
5. www.Expressjs.com
6. www.mong

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	1
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	1
CO*	**2.8**	**2.6**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	2

III B.Tech - V Semester

20CSM353	MACHINE LEARNING TECHNIQUES LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: A Course on Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the knowledge about basic python libraries.
2. To Make use of Data sets in implementing the machine learning algorithms.
3. To analyse the supervised Learning algorithms.
4. To identify and analyse the unsupervised learning algorithms.
5. To use different tools and techniques for implementing machine learning algorithms.

Software: Python, Numpy, Tensorflow, Keras, Pandas, OpenCV.
Appropriate datasets from the following repository can be utilized:

1. https://www.kaggle.com/datasets
2. http://sci2s.ugr.es/keel/datasets.php#sub1

List of Experiments:

1. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
2. Study of Python Libraries for ML application such as Pandas and Matplotlib
3. Demonstrate various data pre-processing steps like Data Cleaning, Data Integration, Data Transformation, Data Reduction or Dimensionality Reduction.
4. Implement and demonstrate Simple Linear Regression. Use the appropriate data set.
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn.
6. Demonstration of Regularization-LASSO, Ridge regression using appropriate data set.
7. Implementation of Logistic Regression using sklearn.
8. Write a program to demonstrate the working of the decision tree algorithm. Use an
9. appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
10. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
11. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.
12. Write a program to implement Support vector machine.
13. Write a program to demonstrate the working of K-Means Clustering

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the python libraries.	**PO1**
CO2	Analyze the use of data sets in implementing ML algorithms	**PO2**
CO3	Implement the supervised learning algorithms in different applications.	**PO3**
CO4	Identify and implement appropriate unsupervised learning algorithm for solving complex problems.	**PO4**
CO5	Identify the appropriate tools and data sets for real-time implementation.	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments	**PO10**
CO9	Continue update skill related to Python and Weka tool Tool and implementing programs in future	**PO12**

REFERENCE BOOKS:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.
2. Anuradha Srinivasaraghavan and Vincy Joseph "Machine Learning", Wiley Publisher, 2019.
3. SaikatDutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", Pearson, 2019.
4. Alpaydin Ethem, "Introduction to Machine Learning", 3rd Edition, PHI learning privatelimited, 2019.

REFERENCE WEBSITES:

1. Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2. Machine Learning | Coursera

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	3	3	**3**	**-**	**3**

III B.Tech - V Semester

20CSE247	SOFTWARE ENGINEERING AND CASE TOOLS LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn and implement the fundamental concepts of Software Engineering.
2. To explore functional and non-functional requirements through SRS.
3. To practice the various design diagrams through the appropriate tool.
4. To learn to implement various software testing strategies.
5. To develop a mini-project by applying the UML Concepts

List of Experiments:

Do the following Ten exercises for any two projects given in the list of mini projects:

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing
3. Phase related documents.
4. Preparation of Software Configuration Management and Risk Management related documents.
5. Study and usage of any Design phase CASE tool
6. Performing the Design by using any Design phase CASE tools.
7. Draw a complete class diagram and object diagrams using Rational tools.
8. Reverse Engineer any object-oriented code to an appropriate class and object diagrams.
9. Develop test cases for unit testing and integration testing
10. Develop test cases for various white box and black box testing techniques.

Suggested domains for Mini-project:

1. ATM System
2. Library Management System
3. Passport automation system.
4. Hospital Management System
5. College Management System
6. On-line Examination System
7. E-ticketing
8. Recruitment system
9. Conference Management System

Suggested Software Tools:

- ArgoUML, Eclipse IDE, Visual Paradigm, Visual case and Rational Suite

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Acquaint with historical and modern software methodologies	**PO1**
CO2	Understand the phases of software projects and practice the activities of each phase	**PO2**
CO3	Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment	**PO3**
CO4	Implement various software testing strategies.	**PO4**
CO5	Develop the mini projects using CASE Tools	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. Roger S. Pressman, "Software Engineering A Practitioner Approach", 1996, MGH.
2. Ian Sommerville, "Software Engineering" 5th edition, Pearson Edu, 1999.
3. Pankaj Jalote, "An Integrated Approach to software engineering", Narosa, 1991.
4. Grady Booch, "Object- Oriented Analysis and Design with Applications", 2nd edition, Pearson Education, New Delhi, India, 2007.

REFERENCE WEBSITE:

1. http://vlabs.iitkgp.ac.in/se/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

III B.Tech - V Semester

20MAC315	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the Indian constitution, fundamental rights and duties.
2. To know the procedure of union government and its administration.
3. To know the procedure of governor role, CM and council of ministers and position.
4. To know the procedure of district and village level administration.
5. To gain the knowledge of electoral system in India.

UNIT –1: INTRODUCTION (6)

Introduction to Indian Constitution – Constitution - Meaning of the term - Indian Constitution – Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

UNIT –2: UNION GOVERNMENT AND ITS ADMINISTRATION (6)

Union Government and its Administration Structure of the Indian Union - Federalism – Centre – State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

UNIT –3: STATE GOVERNMENT AND ITS ADMINISTRATION (6)

Governor Role and Position, CM and Council of ministers. State Secretariat: Organization, Structure and Functions

UNIT –4: LOCAL ADMINISTRATION (6)

District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI – Zilla Parishath - Elected officials and their roles – CEO, Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT –5: ELECTION COMMISSION (6)

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

Total Hours: 30

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand historical background of the constitution making and its importance for building a democratic India.	**PO6, PO8, PO12**
CO2	Understand the functioning of three wings of the government ie.,executive, legislative and judiciary.	**PO6, PO8, PO12**
CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.	**PO6, PO8, PO12**
CO4	Analyze the decentralization of power between central, state and local self-government	**PO6, PO8, PO12**
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	**PO6, PO8, PO12**

TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust

REFERENCE BOOKS:

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, " Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, " Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

REFERENCE WEBSITES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO MAPPING:

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

III B.Tech - V Semester

20CAI357	INDUSTRY INTERNSHIP / COMMUNITY SERVICE PROJECT- EVALUATION	L	T	P	C
		0	0	0	1.5

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training in industry.
2. The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.

SCHEME OF INDUSTRY INTERNSHIP:

1. At the end of the Industrial Internship, the candidate shall submit a certificate from the organization where he/she has undergone industrial training and also a brief report.
2. An industry internship report to be submitted by the individual and along with the internship certificate provided by the organization, which will be reviewed and evaluated by a Committee constituted by the Head of the Department.
3. The evaluation for 100 marks will be carried out internally based on this internship report and a Viva-Voce Examination will be conducted by a Departmental Committee constituted by the Head of the Department/Institution.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate in-depth knowledge on the selected topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for selected work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen selected problem.	**PO3**
CO4	Undertake investigation of selected problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for selected work	**PO5**
CO6	Apply selected information for sustainable development of the society.	**PO6**
CO7	Understand the impact of selected concept in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the selected work.	**PO8**
CO9	Function effectively as individual and a member in the internship.	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting internship report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the internship.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the selected topic.	**PO12**

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	3	-	-	-	-	-	-
CO7	-	-	-	-	-	-	3	-	-	-	-	-
CO8	-	-	-	-	-	-	-	3	-	-	-	-
CO9	-	-	-	-	-	-	-	-	3	-	-	-
CO10	-	-	-	-	-	-	-	-	-	3	-	-
CO11	-	-	-	-	-	-	-	-	-	-	3	-
CO12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

III B.Tech - V Semester
(OPEN ELECTIVE – 1)

20OHSM351	GRAPH THEORY WITH APPLICATIONS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the representation of graphs and understanding the Graph Isomorphism, Sub graph-Vertex degrees, Walk, Paths, Cycles-graph connection, Bipartite graphs.
2. To understand the Trees concepts, digraphs, binary relations, Shortest path algorithmsand to familiarize the knowledge of graph theory
3. To understand the matrix representation of graphs, designing incidence matrix,Adjacency matrix and circuit matrix
4. To explore the use of graphs in various applications in Switching and Coding Theory
5. To identify the important graph based real time applications of electrical networks suchas RLC Networks with Independent sources, LOOP circuits

UNIT – 1: GRAPH THEORY INTRODUCTION (9)

Graph and simple graphs (Complete graphs, Complement of graph)- Graph isomorphism–Sub graph-Vertex degrees, walk, paths, cycles-graph connection and components-Bipartite graphs.

UNIT – 2: DIRECTED GRAPHS AND SHORTEST PATH ALGORITHMS (9)

Trees – Cut edges- Cut vertices-Blocks , Directed graphs types of directed graphs - digraphs and binary relations – directed paths and connectedness - Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

UNIT – 3: MATRIX REPRESENTATION OF GRAPHS (9)

Introduction - Adjacency matrix -Applications of Adjacency matrix-sufficient condition for isomorphism of graphs-power of an adjacency matrix-Adjacency matrix of a digraph-incidence matrix-circuit matrix-cut set matrix.

UNIT - 4: GRAPHS IN SWITCHING AND CODING THEORY (9)

Contact Networks – Analysis of Contact Networks – Synthesis of Contact Networks – Sequential Switching Networks – Unit Cube and its Graph – Graphs in Coding Theory.

UNIT – 5: ELECTRICAL NETWORK ANALYSIS BY GRAPH THEORY (9)

Introduction - Kirchhoff's current and Voltage laws-Loop currents and Node Voltages- RLC Networks with Independent sources: Nodal analysis, Loop analysis.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate knowledge in reading and writing rigorous mathematical proofs involving introductory aspects of graphs and develop analytical skills in solving graph theoretic problems	**PO1,PO2,PO3 PO4**
CO2	Demonstrate knowledge in Trees concepts, digraphs, binary relations, and Develop analytical skills in solving problems involving directed graphs and shortest path algorithm	**PO1,PO2,PO3 PO4**
CO3	Demonstrate knowledge in matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix and explore analytical skills in solving problems involving adjacency matrix and incidence matrix	**PO1,PO2,PO3 PO4**
CO4	Demonstrate knowledge in significant practical applications of graphs in Switching and Coding Theory; explore analytical skills in solving practical problems using graph theory concepts and Develop skills in designing Mathematical models for real time applications in coding theory.	**PO1,PO2,PO3 PO4**
CO5	Demonstrate knowledge in significant real time applications of electrical networks such as RLC Networks Independent sources; explore analytical skills in solving practical problems involving using graph theory concepts and Develop skills in designing Mathematical models for real time electrical networks.	**PO1,PO2,PO3 PO4**

TEXT BOOKS:

1. J.P.Trimblay and R.Manohar ,"Discrete mathematical structures with applications to computer science", 27/e, Tata Mc Graw Hill Publications , 2006, New Delhi.
2. Narasingh Deo,"Graph Theory with applications to engineering and computer Science", 25/e, Printice – Hall of India Private Limited, 2003, New Delhi

REFERENCE BOOKS:

1. Clark J. And Holton D.A., " A first look at Graph theory", Allied Publishers, 1999.
2. R.B.Bapat , Graphs and Matrices, Springer, London Dordrecht Heidelberg, New York, 2010.
3. Gary Haggard John Schlipf, Sue Whitesides, "Discrete Mathematics for Computer Science", 4/e, 2007, Thomson Publication, 2008, New Delhi.
4. S.D Sharma , "Operation Research", KedarNath Ram Nath & Co, Meerut . 2007.
5. J.A.Bonday and U.S.R. Murthy, "Graph Theory with application" , North Holland, 1976 .

REFERENCE WEBSITE:

1. https://onlinecourses.nptel.ac.in/noc21_cs48/preview

CO-PO MAPPING:

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

III B.Tech - V Semester
(OPEN ELECTIVE – 1)

20OCIV351	AIR POLLUTION AND CONTROL	L	T	P	C
		3	0	0	3

PRE-REQUISITES: A Course on Environmental Studies and Engineering

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge about the various sources of Air pollution and its effects onhuman beings, Vegetation and Materials.
2. To Analyse The various air pollutant dispersion models
3. To provide knowledge about control methods and details of control equipments
4. To demonstrate Various sources of Noise pollution and control measures
5. To Identify the major sources of noise pollution, effects and control measures

UNIT -1: SOURCES AND EFFECTS OF AIR POLLUTANTS (9)

Air Pollution – Definitions, Scope- Significance and Episodes- Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary- point and Nonpoint- Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Air pollutants on man-material and vegetation- Global effects of air pollution – GreenHouse effect- Heat Islands- Acid Rains- Ozone Holes etc. Lapse Rates- Pressure Systems- Winds and moisture plume behavior and plume Rise Models- Gaussian Model for Plume Dispersion

UNIT -2: DISPERSION OF POLLUTANTS (9)

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx; NOx; CO; HC etc., air-fuel ratio- Computation and Control of products of combustion- Meteorology and plume Dispersion- properties of atmosphere- Heat- Pressure- Wind forces- Moisture and relative Humidity- Influence of Meteorological phenomena on Air Quality wind rose diagrams.

UNIT -3: AIR POLLUTION CONTROL (9)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment – gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT -4 : AIR QUALITY MANAGEMENT (9)

Air quality standards – Air quality monitoring – Preventive measures – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement

UNIT -5: NOISE POLLUTION (9)

Introduction -Sources of noise pollution – Effects – Assessment – Standards – Control methods Prevention - Environmental Impact Assessment and Air quality.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will beable to		POs related to COs
CO1	Identify the major sources of air pollution and understandtheir effects on health and environment.	**PO1, PO7**
CO2	Evaluate the dispersion of air pollutants in the atmosphereand to develop air quality models	**PO2, PO3**
CO3	Design the control techniques for particulate and gaseous emissions	**PO3, PO1**
CO4	Understand the standards of air quality and legal framework	**PO1, PO6**
CO5	Identify the major sources of noise pollution, effects and control measures	**PO1, PO7**

TEXT BOOKS:

1. M. N. Rao and H. V. N. Rao," Air pollution",– Tata McGraw Hill Company.
2. K.V.S.G. Murali Krishna ,"Air pollution and control", Kaushal Publishers.

REFERENCE BOOKS:

1. S.Padmanabha Murthy," Environmental meteorology" , I.K.International Pvt Ltd, New Delhi.
2. BSN.Raju ,Fundamentals of air pollution, Oxford and IBH Publishers, India.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/105/102/105102089/https://nptel.ac.in/courses/105/104/105104099/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	2	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-
CO3	2		2	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	3	-	-	-	-	-	-
CO5	2	-	-	-	-	-	2	-	-	-	-	-
CO*	**1.75**	**2**	**2**	-	-	3	2	-	-	-	-	-

III B.Tech - V Semester
(OPEN ELECTIVE – 1)

20OEEE351	RENEWABLE ENERGY SOURCES	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Describing the current energy scenario in terms of renewable energy plan.
2. To describe the solar energy sources for electricity generation.
3. To understand the functions of wind turbine and ocean thermal energyconversion process.
4. To describe the types bio-energy for electricity generation and geothermal energy.
5. To educate the various new and alternative sources such as MHD power andfuel cells.

UNIT –1: ENERGY SCENARIO (9)

Indian energy scenario in various sectors of domestic, industrial, commercial, agriculture, transportation and others – Present conventional energy status – Present renewable energy status – Potential of various renewable energy sources – Global energy status – Per capita energy consumption in various countries – Future energy plans.

UNIT –2: SOLAR ENERGY (9)

Solar radiation – Measurements of solar radiation and sunshine – Solar thermal collectors – Flat plate and concentrating collectors – Solar thermal applications – Solar thermal energy storage – Fundamentals of solar photo voltaic conversion – Solar cells – Solar PV Systems – Solar PV applications.

UNIT –3: WIND ENERGY AND OCEAN THERMAL ENERGY (9)

Wind Energy: Wind data and energy estimation – Betz limit – Site selection for wind farms – Characteristics – Horizontal and vertical axis wind turbine – Wind turbine generators and its performance – Hybrid systems – Environmental issues – Applications. **Ocean Thermal Energy:** Tidal energy – Wave energy – Open and closed OTEC cycles.

UNIT –4: BIOMASS ENERGY AND GEOTHERMAL ENERGY (9)

Biomass Energy: Bio resources – Biomass direct combustion – Thermochemical conversion – Biochemical conversion – Mechanical conversion – Biomass gasifies – Types of biomass gasifies – Cogeneration – Carbonization – Pyrolysis – Biogas plants – Digesters – Biodiesel production – Ethanol production – Applications. **Geothermal Energy:** Geothermal energy sources – Types of geothermal power plants – Applications – Environmental impact – Small hydro.

UNIT –5: NEW AND ALTERNATIVE ENERGY SOURCES (9)

Fuel Cell: Principle – Types of fuel cells – Hydrogen energy – Properties – Hydrogen production – Storage – Transport and utilization – Safety issues. **Magneto Hydro Dynamic Power:** Principles of magneto hydro dynamic (MHD) power generation – MHD systems – MHD accelerator – MHD engine, power generation systems – Electron gas dynamic conversion.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Explain the current energy scenario in terms of conventional renewable energy and future plan	**PO1, PO2, PO7, PO12**
CO2	Describe the types solar thermal collectors and solar energy sources for electricity generation	**PO1, PO2, PO7, PO12**
CO3	Understand the functions of wind turbine and Ocean Thermal Energy conversion process	**PO1, PO2, PO7, PO12**
CO4	Illustrate the bio-energy for electricity generation and advancement in geothermal Energy	**PO1, PO2, PO7, PO12**
CO5	Demonstrate the various new and alternative sources such as MHD Power and fuel cells	**PO1, PO2, PO7, PO12**

TEXT BOOKS:

1. G.D. Rai, "Non-Conventional Energy Sources", Khanna Publishers, Delhi, 6/e, 2017.
2. Khan.B.H, "Non-Conventional Sources", McGraw-Hill Education Pvt. Ltd, 3/e, 2017.

REFERENCE BOOKS:

1. G. S. Sawhney, "Non-Conventional Energy Resources", PHI Learning, 2012.
2. R.K.Rajput, "Non-Conventional Energy Sources and Utilisation (Energy Engineering)", S. Chand Publishing, 2012.
3. Aldo Vieira da Rosa, "Fundamentals of Renewable Energy Processes", Elsevier Academic Press, 2005.
4. S. P. Sukhatme and J K. Nayak, "Solar Energy", McGraw-Hill Education, 4/e, 2017.
5. Efstathios E. (Stathis) Michaelides, "Alternative Energy Sources", Springer-Verlag Berlin Heidelberg, 2012.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/121/106/121106014/
2. https://nptel.ac.in/courses/112/105/112105221/
3. https://nptel.ac.in/courses/108/108/108108078/
4. https://nptel.ac.in/courses/103/103/103103206/
5. https://nptel.ac.in/courses/103/107/103107157/
6. https://nptel.ac.in/courses/109/101/109101171/
7. https://nptel.ac.in/courses/115/103/115103123/
8. https://nptel.ac.in/courses/108/105/108105058/

CO-PO MAPPING:

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

III B.Tech - V Semester
(OPEN ELECTIVE – 1)

20OMEC351	INDUSTRIAL ROBOTICS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To know the robot drive systems and internal grippers and external grippers
2. To understand the image processing and analysis of image data
3. To learn Robot motion analysis and control.
4. To study the robot language structure and programming
5. To explain the various applications of robots in industry

UNIT–1: FUNDAMENTALS OF ROBOTIC TECHNOLOGY AND DRIVE SYSTEM (9)

Robot anatomy, configuration and motions – Robot specifications – Pitch, yaw, roll, joint notations, speed of motion, pay load – Work volume. Robot Drive System: Pneumatic, hydraulic drives, mechanical and electrical drives – Servo motors and stepper motor. Grippers: Mechanical, pneumatic and hydraulic grippers, magnetic grippers and vacuum grippers – Two fingered and three fingered grippers – Internal and external grippers.

UNIT–2: ROBOT SENSORS AND MACHINE VISION (9)

Robot Sensors: Position of sensors – Range sensors – Proximity sensors – Touch sensors – Wrist sensors – Compliance sensors – Slip sensors. Machine Vision: Camera – Frame grabber – Sensing and digitizing image data – Signal conversion – Image storage and lighting techniques – Image processing and analysis – Data reduction – Edge detection – Segmentation feature extraction – Object recognition.

UNIT–3: ROBOT MOTION ANALYSIS AND CONTROL (9)

Robot Kinematics: Manipulator kinematics – Position representation – Forward and reverse transformation – Adding orientation – Homogeneous transformations – D-H notation – Forward and inverse kinematics. Robot Dynamics: Differential transformatio– Compensating for gravity – Robot arm dynamics. **Trajectory Planning:** Trajectory planning and avoidance of obstacles – Path planning – Skew motion – Joint integrated motion – Straight line motion.

UNIT–4: ROBOT PROGRAMMING (9)

Robot Programming: Lead through programming – Robot language structure – Motion commands of move, speed control, workplace, path, frames, end effecter operation,sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming.

UNIT–5: ROBOT APPLICATIONS AND IMPLEMENTATION PRINCIPLES (9)

Robot Applications: Material transfer and machine loading / unloading – Processing applications in spray coating – Assembly and inspection automation – Future applications of robot in mines, under water and space. **Implementation Principles:** Selection of robots in industry applications – Economic analysis of the robot.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the robot drive systems and internal grippers and external grippers.	**PO1,PO2**
CO2	Recognize the image data and analysis the image processing	**PO1,PO2**
CO3	Understand the basic concepts of robot motion and analysis	**PO1,PO2, PO3,PO4**
CO4	Know the robot language structure and robot programming.	**PO1,PO2,PO4,PO3,PO5**
CO5	Explain the applications of robots in industries and Safety considerations in workplace	**PO1,PO2,PO3,PO4,PO5, PO6**

TEXT BOOKS:

1. Mikell P Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G Odrey and Ashish Dutta,"Industrial Robotics: Technology, Programming and Applications", Tata McGraw-Hill Education Pvt. Ltd, 2/e, 2012.
2. K.S. Fu, R.C.Gonzales and C.S.G.Lee,"Robotics: Control, Sensing, Vision and Intelligence", Tata McGraw-Hill Education Pvt. Ltd., Noida ,1/e, 2008,.

REFERENCE BOOKS:

1. Introduction to Robotics: Analysis, Control, Applications, 3/e, 2020, Saeed B.Niku, Wiley India Pvt, Ltd., New Delhi.
2. Introduction to Robotics: Mechanics and Control, John J. Craig, 3/e, 2008, Pearson Education, New Delhi.
3. Robotics: Fundamental Concepts and Analysis, Ashitava Ghosal, 1/e, 2006, Oxford University Press, New Delhi.
4. Robotics Technology and Flexible Automation, S.R.Deb and Sankha Deb, 2/e, 2010, Tata McGraw-Hill Education Pvt. Ltd., Noida.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/107106090
2. https://nptel.ac.in/courses/112107289
3. https://nptel.ac.in/courses/112108093
4. https://nptel.ac.in/courses/112104298
5. https://nptel.ac.in/courses/112101099

CO-PO MAPPING:

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

III B.Tech - V Semester
(OPEN ELECTIVE – 1)

20OECE351	**AUTOMOTIVE ELECTRONICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on basics of automotive electronics in vehicle system
2. To comprehend the working principles of sensors and actuators in automobiles
3. To develop skills on engine control and management systems
4. To study various automotive vehicle management systems in automobiles.
5. To gain knowledge on various communication protocols in vehicles.

UNIT –1: INTRODUCTION TO VEHICLE SYSTEM & AUTOMOTIVE ELECTRONICS (9)

Evolution and Need of Automotive electronics, Need of electronics in engine and chassis systems, Fuel Injection system engine, braking and steering systems, Need of Electronic Control Unit (ECU) in vehicle system, Components of ECU, Inputs and Outputs of ECU, Control of Vehicle systems using ECU.

UNIT –2: AUTOMOTIVE SENSORS AND ACTUATORS (9)

Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, Temperature sensors: Coolant and Exhaust gas temperature, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays

UNIT –3: ELECTRONIC ENGINE MANAGEMENT SYSTEM (9)

Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems. Starting and charging system.

UNIT –4: ELECTRONIC VEHICLE MANAGEMENT SYSTEM (9)

Antilock braking system, electronic suspension system, electronic steering control, traction, Transmission control, Safety: Airbags, collision avoiding system, low tire pressurewarning system

UNIT –5: EMBEDDED SYSTEM COMMUNICATION PROTOCOLS (9)

Introduction to control networking – Communication protocols in embedded systems – SPI, I2C, USB – Vehicle communication protocols – Introduction to CAN, LIN, FLEXRAY, MOST, KWP2000.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Describe various vehicle systems in an automobiles and electronic control unit.	**PO1**
CO2	Illustrate different types of sensors and actuators in an Automobiles	**PO1**
CO3	Provide knowledge about engine management system.	**PO1,PO2**
CO4	Comprehend the various control systems used in automotive applications	**PO1,PO2**
CO5	Describe various vehicle communication protocols used in automobiles.	**PO1,PO2**

TEXT BOOKS:

1. Joerg Schaeuffele, Thomas Zurawka, "Automotive Software Engineering Principles, Processes, Methods and Tools", SAE International, 2005.
2. Ronald K. Jurgen, "Automotive Electronics Handbook", McGraw Hill Publications,1999.
3. BOSCH "Automotive Handbook", SAE International, 10th Edition, 2018.

REFERENCE BOOKS:

1. Denton. T, "Automobile Electrical and Electronic Systems", 4th edition, 2012.
2. Nicholas Navit, "Automotive Embedded System Handbook", CRC Press, Taylorand Francis Group, 2009.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/107/106/107106088/
2. https://onlinecourses.nptel.ac.in/noc21_ee32/preview
3. https://ncert.nic.in/vocational/pdf/ivas103.pdf

CO-PO MAPPING:

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

III B.Tech - VI Semester

20CSM361	NEURAL NETWORKS AND DEEP LEARNING	L	T	P	C
		2	1	0	3

PRE-REQUISITES: A course on Machine Learning

COURSE EDUCATIONAL OBJECTIVES:

1. To acquire knowledge about different mathematical tools for Deep Learning.
2. To understand fundamentals of artificial neural networks.
3. To understand knowledge about training deep neural networks.
4. To know about convolutional networks.
5. To acquire knowledge about sequence-based models and other DL architectures.

UNIT-1: MATHEMATICAL TOOLS FOR DEEP LEARNING (9)

Linear Algebra-Tensor, Rank, Norm, Trace, Eigen values and Eigen vectors, Singular value decomposition, Statistics-Random variable, Poisson distribution, Normal distribution, Sampling, Central limit theorem, Expectation, Variance, Covariance, Calculus-Derivatives, rules for derivatives, Partial derivatives.

UNIT-2: FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORK (ANN) (9)

Understanding the biological neuron, Exploring the artificial neuron, Rosenblatt's Perceptron, Types of activation functions-linear function, non-linear function, soft max function. Architectures of neural network-Single layer feed forward network, Multi-layer feed forward ANN, recurrent network, Learning process in ANN-Gradient descent and back propagation.

UNIT-3: TRAINING DEEP NEURAL NETWORK (9)

Deep L-layer neural network, Initializing Weights-He/Kaiming initialization, Xavier initialization. Batch, Mini-batch and stochastic gradient descent. Regularization-L1/L2 regularization, Early stopping, Dropout regularization, data augmentation. Normalization of inputs-Batch normalization, Batch norm as regularizer.

UNIT -4: CONVOLUTIONAL NETWORKS (9)

Building blocks of CNN- Kernel, Convolution Layer, Pooling Layer, Building a CNN- Going under the Hood of CNN, Comparing CNN with Traditional ANN, Popular CNN Architectures-ResNet, AlexNet, Object Detection- Bounding Box, Sliding Window-Based Object Detection, YOLO Algorithm.

UNIT -5: SEQUENCE-BASED MODELS AND OTHER DL ARCHITECTURES (9)

Recurrent neural network (RNN)-Data preparation for RNN, Vanishing gradient problem and RNN. Long short-term memory (LSTM), Gated RNNs, Bidirectional RNNs. Other DL Architectures Encoder-Decoder architecture, Auto encoders, Generative adversarial network (GAN).

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the mathematical tools for deep learning.	**PO1,PO2**
CO2	Analyze the fundamental concepts of Artificial neural networks.	**PO1,PO3**
CO3	Understand and apply the deep neural networks	**PO1,PO2,PO4**
CO4	Identify the concepts of convolutional neural networks and implement for complex problems.	**PO1,PO2,PO3, PO4**
CO5	Understand and analyse about sequence-based models and other DL architectures and use for real-world problems	**PO1,PO2,PO4, PO5**

TEXT BOOKS:

1. Amit Kumar Das, Saptarsi Goswami, Pabitra Mitra, Amlan Chakrabarti, —Deep Learning‖ , Pearson Paperback, First Edition, 2021.
2. Ian Goodfellow, YoshuaBengio, Aaron Courville, —Deep Learning‖ , MIT Press,2016.

REFERENCEBOOKS:

1. Josh Patterson and Adam Gibson, -Deep learning: A practitioner's approach‖ , O'Reilly Media, First Edition,2017.
2. Nikhil Buduma, —Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms‖ , O'Reilly, Shroff Publishers, 2019.

REFERENCE WEBSITES:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf
4. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
5. https://www.deeplearningbook.org
6. https://nptel.ac.in/courses/106105215

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	3	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	**2.6**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - VI Semester

20CAI361	PRINCIPLES OF ROBOTICS	L	T	P	C
		2	1	0	3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the basic concept how AI techniques and select the agent of Robotics.
2. To provide the knowledge of basic concepts of robotics and its importance in the modern world and classification of robots.
3. To acquire the knowledge of Robot Actuators, Sensors and Machine Vision.
4. Examine the manipulator kinematics, dynamics for typical robots
5. Apply a program that the robot can integrate with the manufacturing system

UNIT-1: INTRODUCTION TO ROBOTICS (9)

Automation versus Robotic technology, Laws of robot, Progressive advancements in Robots, Robot Anatomy, Classification of robots-coordinate method, control method; Specification of robots. Classification of End effectors – Tools as end effectors, Mechanical-adhesive -vacuum-magnetic-grippers.

UNIT-2: ROBOT ACTUATORS, SENSORS AND MACHINE VISION (9)

Robot Actuators and Feedback Components: Actuators - Pneumatic and Hydraulic actuators, electric & stepper motors, comparison. Position sensors, resolvers, encoders, velocity sensors, tactile sensors, Proximity sensors, Slip Sensor, Range Sensor, Force Sensor.

Unit-3 : MACHINE VISION (9)

Camera, Frame Grabber, Sensing and Digitizing Image Data Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications, Inspection, Identification, Visual Serving and Navigation.

UNIT-4: MANIPULATOR KINEMATICS AND TRAJECTORY PLANNING (9)

Mathematical representation of Robots - Position and orientation, Homogeneous transformations - D-H notation, Forward and inverse kinematics. Manipulator dynamics, Differential transformation, Jacobeans. Trajectory planning and avoidance of obstacles, path planning, joint integrated motion – straight line motion, basics of trajectory planning, polynomial trajectory planning.

UNIT-5: ROBOT APPLICATIONS AND PROGRAMMING (9)

Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading, Processing, spot and continuous arc welding & spray painting, Assembly and Inspection. Robot Programming: Types, features of languages and software packages.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate the knowledge in an application of AI, and select strategies based on applicationrequirement.	**PO1, PO2**
CO2	Describe the basic concepts of robotics and its importance in the modern world and classificationof robots and its end effectors for typical manufacturing industry and service sector.	**PO1, PO2, PO3**
CO3	Summarize the perception about robot components, actuators, sensors and machine vision.	**PO1, PO2**
CO4	Analyze the manipulator kinematics, dynamics for typical robots which will be used for complexoperations and analyze the path planning for typical robots.	**PO1, PO2, PO3, PO5**
CO5	Choose a program that the robot can integrate with the manufacturing system to produce qualityproducts with minimum cost with optimum usage of resources.	**PO1,PO2, PO3, PO4, PO5**

TEXTBOOKS:

1. M.P. Groover, Industrial Robotics, Second Edition, New Delhi, Tata McGraw Hill, 2017.
2. R.K. Mittal & I.J.Nagrath, Robotics and Control, New Delhi, 3rdEdition, Tata McGraw Hill, 2017.
3. John J.Craig, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

REFERENCE BOOKS:

1. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
2. K.S. Fu, Robotics, New Delhi, 3rd Edition, Tata McGraw Hill, 2008.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/107106090
2. https://nptel.ac.in/courses/112107289
3. https://nptel.ac.in/courses/112108093
4. https://nptel.ac.in/courses/112104298
5. https://nptel.ac.in/courses/112101099

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	--
CO3	3	3	3	-	-	-		-	-	-	-	-	-	-
CO4	3	3	3	3	-	-		-	-	-	-	-	-	-
CO5	3	3	-	-	3	-	-		-	-	-	-	-	-
CO*	**3**	**1.8**	**3**	**3**	**3**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - VI Semester

20CSE363	COMPUTER NETWORKS	L	T	P	C
	(Common to CSE, CSE(AI&ML), CSE(AI), CSE(DS))	2	1	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on Identify the components required to build different types of networks, understand the OSI and TCP/IP architectures and different data link layer protocols.
2. To be exposed to the required functionality at the Ethernet.
3. To understand the different routing protocols, internet protocols and IP addressing.
4. To learn the use of TCP, UDP protocols.
5. To develop skills to apply the concept of application layer protocols.

UNIT 1: INTRODUCTION, PHYSICAL AND DATA LINK LAYER (9)

Network Hardware - Network software – OSI & TCP/IP References models - Guided transmission media – Wireless Transmission – Communication Satellites – Switching - Data link layer design issues - Error detection and corrections – Stop and Wait protocol – Sliding window protocol.

UNIT 2: MEDIUM ACCESS CONTROL SUB LAYER (9)

Multiple access protocols – **Ethernet:** Ethernet physical layer - Ethernet MAC sub layer protocol - Switched Ethernet - Fast Ethernet –Gigabit Ethernet- **Wireless LANS:** The 802.11 Architecture and protocol stack - The 802.11 physical layer – The 802.11 MAC sub layer protocol - The 802.11frame structure- **Bluetooth:** Bluetooth Architecture- Bluetooth Protocol Stack-Bluetooth radio layer – Bluetooth link layer.

UNIT 3: NETWORK LAYER (9)

Network layer design issues - Routing algorithms (RIP, OSPF, BGP, DSDV, DSR) – Congestion control algorithms – Internetworking – **The Network Layer in the Internet:** IPv4 - IPv6 - IP Addresses.

UNIT 4: TRANSPORT LAYER (9)

Elements of transport protocols – Congestion Control - The Internet Transport Protocols: UDP - **The Internet Transport Protocols: TCP:** Introduction – TCP Service model –TCP protocol – TCP segment header – TCP Connection Establishment, Connection release – TCP sliding window – TCP timer management – TCP Congestion control.

UNIT 5: APPLICATION LAYER (9)

Domain Name System- Electronic mail (SMTP, POP3, IMAP, MIME) - WWW – HTTP – FTP - Web Services – SNMP

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate knowledge on fundamentals of network components and topologies, Analyze the OSI and TCP/IP stack and the different protocols in Data Link layer.	**PO1, PO2**
CO2	Classify the Media Access Control Protocols and different Internetworking	**PO1, PO2**
CO3	Demonstrate various types of routing techniques and design the different routing protocols for wired / wireless.	**PO1, PO2, PO3, PO4, PO5**
CO4	Demonstrate uses of datagram delivery	**PO1, PO2, PO3, PO4, PO5**
CO5	Apply the different strategies Operations of DNS, FTP, HTTP, Email Protocols, SNMP	**PO1, PO2, PO3, PO4**

TEXT BOOKS:

1. Andrew S. Tanenbaum, David J. Wetherall, –Computer Networks‖, Pearson Education, New Jersey, 5th edition, 2011.
2. Behrouz A. Forouzan,—Data Communications and Networking‖, Tata McGraw Hill, New Delhi, 5th edition, 2012.

REFERENCES BOOKS:

1. Michael A.Gallo, William M. Hancock, -Computer Communications and Networking Technologies‖, 2/e, Cengage Learning, New Delhi, 2005.
2. Natalia Olifer, Victor Olifer,—Computer Networks: Principles, Technologies and Protocols for Network Design‖,1/e,Wiley India, New Jersey, 2006.
3. Nader F. Mir, Computer and Communication Network, 1/e, Pearson Education, New Jersey, 2007.
4. James F.Kurose - K.W.Ross,—Computer Networking: A Top-Down Approach Featuring the Internet‖, Pearson Education, New Jersey, 6th edition, 2012.
5. G.S.Hura and M.Singhal,—Data and Computer Communications‖,1/e, CRC Press, Taylor and Francis Group, FL United States, 2001.

REFERENCE WEBSITES:

1. https://www.cisco.com/c/en/us/solutions/smallbusiness/resourcecenter/networking/networking-basics.html
2. https://memberfiles.freewebs.com/00/88/103568800/documents/Data.And.Computer.Communications.8e.WilliamStallings.pdf
3. https://nptel.ac.in/courses/106/105/106105080/
4. https://nptel.ac.in/courses/106/105/106105081/

CO-PO MAPPING:

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

III B.Tech - VI Semester

20CAI362A	AI AND GAMING APPLICATION	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To acquire knowledge about Models and complexities of Game AI.
2. To identify fundamentals movement algorithms and steering behaviour
3. Apply the appropriate AI algorithms for motor control and motion.
4. Demonstrate the robust AI algorithms for decision making.
5. Apply and demonstrate the algorithm for real world problem.

UNIT- 1: INTRODUCTION TO GAME AI (9)

Introduction – Nature of Game AI – Models of game AI – AI Engine structure – representations, complexity, and constraints – Analytical Geometry 1

UNIT- 2: MOVEMENT ALGORITHMS AND STEERING BEHAVIOUR (9)

Simple State Machines – Computational Geometry – Kinetic and Dynamic Movement – Steering and combining steering – Analytical Geometry 2

UNIT- 3: COORDINATED MOVEMENT AND MOTOR CONTROL (9)

Interaction with Physics engine – Jumping – Coordinated movement – Motor Control – Path finding: path finding graphs – Dijkstra – A* – hierarchical path finding – motion planning

UNIT- 4: DECISION MAKING, TACTICS AND LEARNING (9)

Decision Making: Decision tree – State Machines – Fuzzy Logic Markov Systems – Goal oriented behaviour – Rule-based systems – black board architectures – Tactics and Strategy: waypoint tactics, tactical analyses, tactical path finding, coordinated action

UNIT- 5: LEARNING AND GAME PLAYING (9)

Learning: Decision tree learning, Naive Bayes, Reinforcement learning, Artificial Neural Networks – Game Playing: game theory, mini max, transposition tables, opening books and set plays, turn-based strategy games.

Case Studies:

Design the Chatbot for Tourism Department
Design chatbot for open the account in the Facebook
Design chatbot for finding the diseases for the patients

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Explain the Models and complexities of Game AI.	**PO1, PO2**
CO2	Identify the Computational geometry and Analytical Geometry.	**PO1, PO2, PO3, PO4**
CO3	Select the appropriate AI algorithms for motor control and motion planning.	**PO1, PO2,PO3**
CO4	Apply efficient and robust AI algorithms for decision making and tactical analyses.	**PO1, PO2, PO3, PO5**
CO5	Analyze learning algorithms and game playing approaches to real world applications	**PO1,PO2, PO3, PO4, PO5**

TEXT BOOKS:

1. Artificial Intelligence for Games, 2nd edition, by Ian Millington and Morgan Kaufmann, 2009.
2. Sadler, Matthew, and Natasha Regan. "Game changer." Alpha Zero's Ground breaking Chess Strategies and the Promise of AI. Alkmaar. The Netherlands. New in Chess (2019).

REFERENCE BOOKS:

1. Brewka, Gerd. "Artificial intelligence—a modern approach by Stuart Russell and Peter Norvig, Prentice Hall. Series in Artificial Intelligence, Englewood Cliffs, NJ." The Knowledge Engineering Review 11.1 (1996): 78-79.

REFERENCES WEBSITES:

1. https://www.gamedesigning.org/gaming/ai-in-gaming/
2. https://builtin.com/artificial-intelligence/ai-games

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-
CO4	2	2	3	-	3	-	-	-	-	-	-	-
CO5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**2.8**	**2.2**	**2.4**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - VI Semester

		L	T	P	C
20CAI362B	**COMPUTER GRAPHICS AND MULTIMEDIA TECHNOLOGY**	**3**	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To acquire knowledge about various colour models and colour selection for creating basic graphics
2. To analyze Transformations for 2-D Graphics.
3. To understand 3-D graphics and Viewing transformations in 3D Objects.
4. To understand multimedia system design & multimedia file handling.
5. To understand the basic concept of hypermedia

UNIT -1: ILLUMINATION AND COLOR MODELS (9)

Light sources- basic illumination models- half one patterns and dithering techniques; Properties of light- Standard primaries and chromaticity diagram; Intuitive colour concepts- RGB colour model – YIQ colour model – CMY colour model – HSV colour model- HLS colour model; Colour selection. Output primitives- points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms, Pixel addressing and object geometry, filled are a primitives.

UNIT-2: TWO-DIMENSIONAL GRAPHICS (9)

Two dimensional geometric transformations- Matrix representation and homogeneous coordinates, composite transformations; Two-dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-view port coordinate transformation, Two-dimensional viewing functions; clipping operations- point, line, and polygon clipping algorithms.

UNIT-3: THREE-DIMENSIONALGRAPHICS (9)

Three dimensional concepts; Three-dimensional object representations- Polygon surfaces- Polygon tables- Plane equations- Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces-B-Spline curves and surfaces.
Transformation and Viewing: Three dimensional geometric and modeling transformations- Translation, Rotation, Scaling, Composite transformations; Three-dimensional viewing- viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT-4: MULTI MEDIA SYSTEM DESIGN & MULTI MEDIA FILE HANDLING (9)

Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards –Multimedia databases. Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies.

UNIT-5: HYPERMEDIA (9)

Multimedia authoring and user interface – Hyper media messaging, Mobile messaging- Hyper media message component – Creating hyper media message- Integrated multimedia message standards- Integrated document management- Distributed multimedia systems.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Identify various colour models and colour selection for creating basic graphics.	**PO1, PO2**
CO2	Explain two-dimensional graphics, three dimensional graphics and apply three dimensional transformations.	**PO1, PO2, PO3, PO4**
CO3	Apply Illumination and colour models and apply clipping techniques to graphics.	**PO1, PO2,PO3**
CO4	Apply different types of Multimedia File Format	**PO1, PO2, PO3, PO5**
CO5	Illustrate the multimedia authorizing user interface	**PO1, PO2, PO3, PO5**

TEXT BOOKS:

1. Donald Hearn and Pauline Baker M, -Computer Graphics", Prentice Hall, New Delhi, 2007.
2. Andleigh, P.KandKiranThakrar,Multimedia Systems and Design, PHI, 2003.

REFERENCE BOOKS:

1. Judith Jeffcoate, Multimedia inpractice: Technology and Applications,PHI,1998.
2. Foley , Vandam, Feiner and Hughes, Computer Graphics: Principles and Practice, 2ndEdition, Pearson Education, 2003.
3. Jeffrey Mc Connell, Computer Graphics: Theory into Practice, Jones and Bartlett Publishers, 2006.
4. Hill FS Jr., "Computer Graphics", Maxwell Macmillan, 1990.
5. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and A K Peters, Fundamentals of Computer Graphics, CRC Press, 2010.
6. William M. Newman and Robert F. Sproull, Principles of Interactive Computer Graphics Mc Graw Hill 1978.

REFERENCES WEBSITES:

1. https://archive.nptel.ac.in/courses/117/105/117105083/
2. http://cse.iitm.ac.in/~vplab/computer_graphics.html
3. https://www.blender.org/support/tutorials/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-	-	--
CO3	3	3	3	-	-	-		-	-	-	-	-	-	-
CO4	3	2	2	-	3	-		-	-	-	-	-	-	-
CO5	3	3	2	-	3	-	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**	**1.8**	**2**	**3**	-	-		-	-	-	-	-	-

III B.Tech - VI Semester

20CAI362C	BIO INSPIRED COMPUTING	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the basics of biological systems for the process of Bio-inspired computing
2. Explain complex behavior and Boolean networks of Complex systems
3. Analyze various Artificial Neural Nets for supervised and unsupervised learning
4. Apply the concept for collective behavior, decentralized and self organized systems
5. To understand the Collective Behavior and Swarm Intelligence

UNIT-1: INTRODUCTION (9)

Life and Information - The Logical Mechanisms of Life – Computation- Universal Computation and Computability - Computational Beauty of Nature (fractals, L-systems, Chaos) - Bio-inspired computing – Natural computing -Biology through the lens of computer science

UNIT-2: COMPLEX SYSTEMS & ARTIFICIAL LIFE (9)

Complex Systems and Artificial Life - Complex Networks - Self-Organization and Emergent Complex Behaviour - Cellular Automata - Boolean Networks -Development and Morphogenesis - Open-ended evolution

UNIT-3: NATURAL COMPUTATION (9)

Biological Neural Networks- Artificial Neural Nets and Learning - pattern classification & linear separability - single and multilayer perceptrons, backpropagation - associative memory - Hebbian learning - Hopfield networks - Stochastic Networks – Unsupervised learning

UNIT-4: EVOLUTIONARY SYSTEMS AND ALGORITHMS (9)

Evolutionary Programming: biological adaptation & evolution - Autonomous Agents and Self-Organization: termites, ants, nest building, flocks, herds, and schools. Genetic algorithms: Schema theorem - Reproduction-Crossover-Mutation operators

UNIT-5: SWARM INTELLIGENCE (9)

Collective Behavior and Swarm Intelligence - Social Insects - Stigmergy and Swarm Intelligence; Competition and Cooperation - zero- and nonzero-sum games - iterated prisoner's dilemma - stable strategies - ecological & spatial models - Communication and Multi-Agent simulation – Immuno computing

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Define basics of biological systems for the process of Bio-inspired computing.	**PO1, PO2**
CO2	Explain complex behavior and Boolean networks of Complex systems.	**PO1, PO2, PO3, PO4**
CO3	Analyze various Artificial Neural Nets for supervised and unsupervised learning.	**PO1, PO2**
CO4	Apply the. evolutionary systems and algorithms	**PO1, PO2, PO3, PO5**
CO5	Apply the concept of swarm intelligence for collective behavior, decentralized and self organized systems.	**PO1, PO2, PO3,PO4, PO5**

TEXT BOOKS:

1. Leandro Nunes De Castro, Fernando Jose Von Zuben, —Recent Developments in Biologically Inspired Computing‖ , Idea Group Publishing, 2005.
2. Leandro Nunes De Castro , —Fundamentals of Natural Computing: Basic concepts, Algorithms and Applications‖ , Chapman & Hall/ CRC Computer & Information Science Series, 2006.3. Dario Floreano, Claudio Mattiussi, —Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies‖ , MIT Press, 2008.

REFERENCE BOOKS:

1. Goldberg, , ‖ Genetic algorithms in search optimization and machine learning‖ , Addison Wesley, 1999
2. Xin-She Yang, —Recent Advances in Swarm Intelligence and Evolutionary Computation‖ , Springer International Publishing, Switzerland, 2015.

REFERENCES WEBSITES:

1. http://informatics.indiana.edu/rocha/i-bic/
2. http://web.eecs.utk.edu/~mclennan/Classes/420/
3. http://www.cs.stir.ac.uk/courses/31YB/

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	2	3	-	3	-	-	-	-	-	-	-
CO5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.2**	**1.8**	**2**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - VI Semester

20HSM231	SOFT SKILLS	L	T	P	C
		0	1	2	2

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

1. To encourage all round development of the students by focusing on soft skills
2. To make the students aware of critical thinking
3. To develop problem-solving skills and decision making
4. To develop Emotional Intelligence and Stress Management
5. To develop leadership skills and to function effectively with heterogeneous teams

UNIT -1: SOFT SKILLS & COMMUNICATION SKILLS (9)

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills Intrapersonal & Inter-personal skills - Verbal and Nonverbal Communication

Activities: Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self expression articulating with felicity (The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups – Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT –2: CRITICAL THINKING (9)

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open mindedness – Creative Thinking

Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT –3: PROBLEM SOLVING & DECISION MAKING (9)

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution Methods of decision making – Effective decision making in teams – Methods & Styles.

Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT –4: EMOTIONAL INTELLIGENCE & STRESS MANAGEMENT (9)

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self Regulation –Stress factors – Controlling Stress – Tips.

Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, and sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT–5: LEADERSHIP SKILLS (9)

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Team Building - Time Management

Activities: Forming group with a consensus among the participants- choosing a leader encouraging the group members to express views on leadership- democratic attitude sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

NOTE:

The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendra Singh Dhoni etc.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Demonstrate knowledge effectively on Soft Skill & Communication Skills	**PO1, PO6, PO7, PO8, PO9,PO10, PO12**
CO2	Demonstrate knowledge on Critical Thinking	**PO1, PO6, PO7, PO8, PO9,PO10, PO12**
CO3	Solve problems and take appropriate decisions	**PO1, PO2, PO6, PO7, PO8, PO9, PO10, PO12**
CO4	Effectively manage Emotional Intelligence and Stress Management	**PO1, PO6, PO7, PO8, PO9, PO10, PO12**
CO5	Function effectively as a leader and with heterogeneousteam	**PO1, PO6, PO7, PO8, PO9,PO10, PO11, PO12**

TEXT BOOKS:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha Kapoor Publisher: IK International Publishing House; 0 edition (February 28, 2018)

REFERENCE BOOKS:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books

5. SOFT SKILLS for a BIG IMPACT (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India.

REFERENCE WEBSITES:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	2	2	2	2	3	-	2
CO2	3	-	-	-	-	2	2	2	2	2	-	2
CO3	3	2	-	-	-	2	2	2	2	2	-	2
CO4	3	-	-	-	-	2	2	2	2	2	-	2
CO5	3	-	-	-	-	2	2	2	2	2	3	2
CO*	**3**	**2**	-	-	-	**2**	**2**	**2**	**2**	**2.2**	**3**	**2**

III B.Tech - VI Semester

20CSM362	NEURAL NETWORKS AND DEEP LEARNING LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: A course on Machine learning.

COURSE OBJECTIVES:

1. To understand the context of Neural networks and deep learning.
2. To analyse and design neural network models.
3. To learn the implementation of neural networks.
4. To understand the evaluation techniques of neural networks.
5. To analyse and implement complex real-time problems.

List of Experiments:

1. Introduction of Keras.
2. Installing Keras and packages in Keras.
3. Train the model to add two numbers and report the result.
4. Train the model to multiply two matrices and report the result using keras.
5. Train the model to print the prime numbers using Keras
6. Recurrent Neural Network
    a. Numpy implement of a simple recurrent neural network.
    b. Create a recurrent layer in keras.
    c. Prepare IMDB data for movie review classification problem.
    d. Train the model with embedding and simple RNN layers.
    e. Plot the Results.
7. Consider temperature-forecast as one the example for recurrent neural network and implement
   the following.
    a. Inspect the data of the weather dataset
    b. Parsing the data
    c. Plotting the temperature time series
    d. Plotting the first 10 days of the temperature time series
8. Long short-term memory network
    a. Implement LSTM using LSTM layer in keras
    b. Train and evaluate using reversed sequences for IMDB data
    c. Train and evaluate a bidirectional LSTM for IMDB data
9. Train and evaluate a Gated Recurrent Unit based model
    a. By using GRU layer
    b. By adding dropout and recurrent dropout to GRU layer.
    c. Train a bidirectional GRU for temperature prediction data
10. Convolutional Neural Networks
    a. Preparing the IMDB data
    b. Train and evaluate a simple 1D convent on IMDB Data
    c. Train and evaluate a simple 1D convent on temperature prediction data
11. Develop a traditional LSTM for sequence classification problem.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate knowledge on installing keras and its supporting packages.	**PO1**
CO2	Analyse and identify the various neural network techniques.	**PO2**
CO3	Demonstrate knowledge on design of neural networks.	**PO3**
CO4	Demonstrate knowledge on implementation of neural network techniques.	**PO4**
CO5	Identify and implement complex design problems.	**PO5**
CO6	Follow ethical principles in designing and implementation of various routing algorithms	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiment	**PO10**
CO9	Continue updating their skill related to Networking and routing algorithms	**PO12**

REFERENCE BOOKS:

1. Ian Goodfellow, YoshuaBengio, AaraonCourville, —Deep Learning (Adaptive Computationand Machine Learning series)‖ , MIT Press, 2016.
2. Amit Kumar Das, SaptarsiGoswami, PabitraMitra, AmlanChakrabarti, —Deep Learning‖ , Pearson Paperback, First Edition, 2021.
3. Josh Patterson and Adam Gibson, —Deep learning: A practitioner's approach‖ , O'ReillyMedia, First Edition, 2017.
4. Nikhil Buduma, —Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms‖ , O'Reilly, Shroff Publishers, 2019.

REFERENCE WEBSITES:

1. Introduction to Deep Learning Course | Introduction to Deep Learning Course (rses-dlcourse.github.io)
2. Deep Learning | Introduction to Long Short Term Memory - GeeksforGeeks

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

III B.Tech - VI Semester

20CSE366	NETWORK SIMULATOR LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the knowledge about basic python libraries.
2. To Make use of Data sets in implementing the machine learning algorithms.
3. To analyze the supervised Learning algorithms.
4. To identify and analyze the unsupervised learning algorithms.
5. To use different tools and techniques for implementing machine learning algorithms.

List of Experiments:

1. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
2. Study of Python Libraries for ML application such as Pandas and Matplot lib
3. Demonstrate various data pre processing steps like Data Cleaning, Data Integration, Data
4. Transformation, Data Reduction or Dimensionality Reduction.
5. Implement and demonstrate Simple Linear Regression. Use the appropriate data set.
6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn.
7. Demonstration of Regularization-LASSO, Ridge regression using appropriate data set.
8. Implementation of Logistic Regression using sklearn.
9. Write a program to demonstrate the working of the decision tree algorithm. Use an
10. appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
11. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
12. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set Print both correct and wrong predictions.
13. Write a program to implement Support vector machine.
14. Write a program to demonstrate the working of K-Means Clustering

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Understand the python libraries.	**PO1**
CO2	Analyze the use of data sets in implementing ML algorithms	**PO2**
CO3	Implement the supervised learning algorithms in different applications.	**PO3**
CO4	Identify and implement appropriate unsupervised learning algorithm for solving complex problems.	**PO4**
CO5	Identify the appropriate tools and data sets for real-time implementation.	**PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments	**PO10**
CO9	Continue update skill related to Python and Weka tool Tool and implementing programs in future	**PO12**

REFERENCE BOOKS:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.
2. Anuradha Srinivasaraghavan and Vincy Joseph, —Machine Learning‖ , Wiley Publisher, 2019.
3. SaikatDutt, Subramanian Chandramouli and Amit Kumar Das, —Machine Learning‖ , Pearson, 2019.
4. Alpaydin Ethem, -Introduction to Machine Learning‖ , 3rd Edition, PHI learning privatelimited, 2019.

REFERENCE WEBSITES:

1. Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2. Machine Learning | Coursera

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

III B.Tech - VI Semester

20CAI363	PROJECT SKILLS LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training in design andinnovation.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

The aim of the project skill lab is to deepen comprehension of principles by applying them to a new problem which may be the device / system / component / working mode to be created fabricated may be decided in consultation with the supervisor and if possible with an industry. A project topic must be selected by the students in consultation with their supervisor. The students may be grouped into 3 to 5 and work under a project supervisor.

A project report to be submitted by the group and along with the model / system, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report along with device / system / component / working model jointly by external and internal examiners constituted by the Head of the Department.

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Demonstrate in-depth knowledge on the project topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen project problem.	**PO3**
CO4	Undertake investigation of project problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	**PO5**
CO6	Apply project results for sustainable development of the society.	**PO6**
CO7	Understand the impact of project results in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the project work.	**PO8**
CO9	Function effectively as individual and a member in the project team	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	**PO12**

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	3	-	-	-	-	-	-
CO7	-	-	-	-	-	-	3	-	-	-	-	-
CO8	-	-	-	-	-	-	-	3	-	-	-	-
CO9	-	-	-	-	-	-	-	-	3	-	-	-
CO10	-	-	-	-	-	-	-	-	-	3	-	-
CO11	-	-	-	-	-	-	-	-	-	-	3	-
CO12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

III B.Tech - VI Semester

20MAC352	DESIGN THINKING FOR INNOVATION	L	T	P	C
		2	0	0	0

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Study the concepts of design thinking and innovations.
2. To know the basic research concepts in design thinking.
3. To learn the basic concepts of start-ups in design process.
4. To understand the business model design concepts.
5. To study the principles of innovations in design thinking.

UNIT–1: INTRODUCTION TO DESIGN THINKING (6)

Concept, frame work and principles of design thinking – Criteria of an inspirational design – Writing the inspirational design – Research findings about inspirational design – Pitfallsto avoid – Defining personas – Creating Personas – Importance and application of Personas – Customer experience mapping.

UNIT–2: DESIGN THINKING TO BRIDGE RESEARCH AND CONCEPT (6)

Challenges in idea generation – Need for a systematic method – Visualizing and empathizing – Applying the method – New design ideas – Design heuristics – Value of the design heuristics. **Prototypes in Design:** Product development framework – Prototypes in process – Integrating design into the front end of the innovation process and challenges – Design practice and tools – Integrate design professionals in front end innovation process.

UNIT–3: START-UPS UNDERSTAND AND APPLY DESIGN PROCESSES (6)

Emerging start-up culture – IPR to protect innovation – Path from idea to product – Impact of corporate culture and forces – Pillars of innovation– Knowledge management as intelligence and task- Designing amidst uncertainty– Selected tools for breakthrough innovation – Organizational implications – Design thinking within the firm – Role of key personnel – Organizational practices and culture – Value of design thinking.

UNIT–4: BUSINESS MODEL DESIGN AND PRINCIPLES OF INNOVATION (6)

Business model – Business model design and method – Process of designing a business model – Implementation of business model. **Principles of Innovations:** Most powerful competitors – Type of products will buy the – Best customers for products – Scope of the business right – Avoid commoditization – Disruptive growth – Strategy development process – Good money and bad money – Role of senior executives.

UNIT–5: INNOVATION MANAGEMENT (6)

Importance and overview of innovation process – Innovation in an organizational context – Development activities and design environment – Innovation and invention – Successful and unsuccessful innovation – Different types of innovation – Models of innovation – Disruptive innovations – Cyclic model of innovation with interconnected cycles.

Total Hours: 30

COURSE OUTCOMES:

On successful Completion of the course, students will be able to		POs related to COs
CO1	Understand the concepts of design thinking and innovations.	**PO1,PO2,PO3**
CO2	Explain the basic research concepts in design thinking.	**PO1,PO2,PO3**
CO3	Describe the basic concepts of start-ups in design process.	**PO1,PO2,PO3**
CO4	Explain the business model design concepts.	**PO1,PO2,PO3**
CO5	Demonstrate the principles of innovations in design thinking.	**PO1,PO2,PO3**

TEXT BOOKS:

1. Michael G. Luchs, K. Scott Swan and Abbie Griffin., —Design Thinking - New Product Development Essentials from the PDMA‖ , John Wiley & Sons, Inc., 2016.
2. Clayton M. Christensen and Clayton M. Christensen —The Innovator's Solution - Creating and Sustaining Successful Growth‖ , Harvard Business School Press.

REFERENCE BOOKS:

1. Paul Trott, –Innovation Management and New Product Development‖ 6/e, Pearson Education Ltd.,
2. Creativity in Product Innovation, Jacob Goldenberg and David Mazursky, 2002, Cambridge University Press.
3. The Design of Everyday Things - Revised Edition, Don Norman, 2013, Perseus Books Group.
4. From Imagination to Innovation - New Product Development for Quality of Life, A. Coskun Samli, 2011, Springer New York Dordrecht Heidelberg London
5. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/110106124
2. https://nptel.ac.in/courses/109104109
3. https://nptel.ac.in/courses/107101086
4. https://nptel.ac.in/courses/107104076

CO-PO MAPPING:

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

III B.Tech - VI Semester

		L	T	P	C
20CAI363	**INDUSTRIAL / RESEARCH INTERNSHIP DURING SUMMER VACATION**	**0**	**0**	**0**	**0**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training from Industry / Research and Development centre.
2. The course is designed so as to expose the students to industry environment/research environment and to take up on-site assignment as trainees or interns.

SCHEME OF INDUSTRY INTERNSHIP:

1. Students are encouraged to go to Industrial Internship / Research Internship for at least 2-3 weeks during summer vacation and should be organized by the Head of the Department for every student.

III B.Tech - VI Semester
(OPEN ELECTIVE – 2)

20OHSM361	**LASERS AND FIBER OPTICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To acquire knowledge on fundamentals of LASERS
2. To study the working of different types of LASERS
3. To develop knowledge on applications of LASERS in various fields
4. To gain knowledge in fundamentals of Optical fiber, construction, types, and attenuations
5. To develop knowledge on applications of Optical fibers in various fields

UNIT- 1: LASER INTRODUCTION **(10)**

Introduction- Spontaneous and stimulated emission of radiation- Properties of lasers (monochromacity, directionality, coherence and brightness) - Conditions for laser action: population inversion- Pumping and different pumping mechanisms- Einstein coefficients and relation among the coefficients.

UNIT –2: TYPES OF LASERS **(8)**

Nd-YAG laser- He: Ne laser- Semiconductor laser (GaAs)- Argon Ion Laser-CO2 Laser

UNIT – 3: APPLICATIONS OF LASERS **(9)**

Lasers in Holography- Laser in fusion reaction- Lasers in Raman spectroscopy- Lasers in industry - Lasers in isotope separation- Lasers in medicine.

UNIT – 4: OPTICAL FIBERS **(9)**

Introduction- Construction of fiber – Working principle of optical fiber (total internal reflection)- Propagation of light through the fibers- Numerical aperture , Acceptance angle and Acceptance cone -Fiber types: Refractive index profile and ray propagation-Step and graded index fibers -Attenuation in fibers: Attenuation coefficient and different loss mechanisms.

UNIT – 5: APPLICATIONS OF FIBERS **(9)**

Fiber optic communication system(block diagram)- Sensing applications of fibers: Pressure sensor, Liquid level sensor, Displacement sensor, Chemical sensor – Optical fibers in medicine (endoscopes) - Optical fibers in computer networks (block diagram).

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related toCOs
CO1	Acquire the basic knowledge on LASERS	**PO1, PO12**
CO2	Understand different types of LASERS	**PO1, PO12**
CO3	Develop knowledge on different applications of LASERS	**PO1, PO12**
CO4	Acquire the basic knowledge on Optical Fibers	**PO1,PO12**
CO5	Develop knowledge on different applications of Optical Fibers	**PO1,PO12**

REFERENCE BOOKS:

1. K.Thyagarajan and A.K.Ghatak —Lasers Theory and Applications – Macmillan India Limited, New Delhi.
2. B.BLaud –Lasers And non-Linear Opics‖ second edition, New Age International(P) limited, Publishers,New Delhi.
3. John Powers, Richard D Irwin -An Introduction to Fiber Optic Systems‖ , Second Edition.
4. M.R.Srinivasan ‖ Physics for Engineers‖ -, New Age International, 2009

CO-PO MAPPING:

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

III B.Tech - VI Semester
(OPEN ELECTIVE – 2)

20OCIV361	BUILDING TECHNOLOGY	L	T	P	C
		3	0	0	3

PRE-REQUISITES: A course on building materials their manufacturing process and Utilization in low-cost housing techniques

COURSE EDUCATIONAL OBJECTIVES:

1. To teach various types of building materials their manufacturing process and utilization in low-cost housing techniques
2. To teach the functions and manufacturing process of glass and plastic materials that are commonly used in building construction
3. To teach various types of thermal and acoustic insulation materials used in building construction
4. To teach the functions and importance of various structural components
5. To teach in detail about the materials like paints and floor finishes meant for interior works

UNIT -1: BASICS TERMINOLOGY (9)

Overview of the course, basic definitions, buildings-types-components-economy, and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

UNIT –2: TERMITE PROOFING (9)

Termite proofing: Inspection-control measures and precautions-lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while planning a building.

UNIT –3: VERTICAL TRANSPORTATION IN A BUILDING (9)

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs-other modes of vertical transportation –lifts-ramps- escalators.

UNIT –4: PREFABRICATION SYSTEMS IN RESIDENTIAL BUILDINGS (9)

Prefabrication systems in residential buildings-walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

UNIT –5: ACOUSTICS (9)

Acoustics–effect of noise –properties of noise and its measurements, principles of acoustics of building. Sound insulation-importance and measures

Total Hours: 45

COURSE OUTCOMES:

On successful completion of this course the student will be ableto		POs related toCOs
CO1	Understand the principles in planning and design the buildings	**PO1, PO2**
CO2	To get different types of buildings, principles and planning of the building	**PO1, PO2 ,**
CO3	To know the different methods of termite proofing in buildings	**PO1, PO2**
CO4	Know the different methods of vertical transportation in buildings.	**PO1, PO2 ,PO3, PO4**
CO5	Know the implementation of prefabricated units in buildings and the effect of earthquakes on buildings.	**PO1, PO2 ,**

TEXT BOOKS:

1. ‖ Building construction by Varghese‖ , PHI Learning Private Limited 2nd Edition 2015
2. Punmia.B.C, Jain.A.K and Jain.A.K Laxmi Publications –Building construction‖ 11th edition 2016

REFERENCE BOOKS:

1. National Building Code of India, Bureau of Indian Standards
2. Building construction-Technical teachers training institute, Madras, Tata McGraw Hill.
3. Building construction by S.P.Arora and S.P.Brndra Dhanpat Rai and Sons Publications, New Delhi 2014.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/105102206 https://nptel.ac.in/courses/105103206

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	1	3	-	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-
CO4	1	1	3	3	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-
CO*	**1.6**	**2.6**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech - VI Semester
(OPEN ELECTIVE – 2)

		L	T	P	C
20OEEE361	**POWER PLANT ENGINEERING**	**3**	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the working principles of steam power plants.
2. To understand the working principles of diesel and gas turbine power plant
3. To explain the working of nuclear power plant and safety measures.
4. To know the working of hydroelectric power plant and other energy sources
5. To learn the economics, Energy management and environmental issues.

UNIT –1: STEAM POWER PLANT (9)

Introduction to the sources of energy – Resources and development of power in India. **Steam Power Plant:** Plant layout – Working of different circuits – Types of coal – Properties of coal – Coal handling system – Ash handling system – Feed water treatment. **Combustion Process:** Stages of combustion – Overfeed and underfeed stoker firing – Stoker firing of coal – Pulverized coal firing system – Cyclone furnace – Fluidized bed combustion system – Cooling towers and heat rejection.

UNIT –2: DIESEL AND GAS TURBINE POWER PLANT (9)

Diesel Power Plant: Introduction – IC Engines, types, construction – Plant layout with auxiliaries – Fuel supply system, air starting equipment, lubrication and cooling system – Super charging. **Gas Turbine Power Plant:** Introduction – Classification – Construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines – Combined cycle power plants and comparison.

UNIT –3: NUCLEAR POWER PLANT (9)

Basics of nuclear engineering– Fuels and nuclear reactions – Layout and subsystems – Reflectors – Pressurized water reactor (PWR) – Boiling water reactor (BWR) – Canada Deuterium Uranium reactor (CANDU) – Gas cooled and liquid metal fast breeder reactor – Heavy water reactor – Working and comparison – Safety measures for nuclear plants.

UNIT –4: HYDROELECTRIC POWER PLANT AND RENEWABLE ENERGY SOURCES (9)

Hydroelectric Power Plant: Water power – Hydrological cycle – Hydrographs – Storage and pondage – Classification of dams and spill ways – Hydroelectric typical plant layout and components – Pumped storage power plants – Selection of turbines. **Renewable Energy Sources:** Construction and working principle of wind, tidal, solar photo voltaic, solar thermal, geo thermal, biogas and fuel cell systems.

UNIT –5: ENERGY MANAGEMENT, ECONOMICS AND ENVIRONMENTAL ISSUES (9)

Energy Management: Types of loads – Load distribution and sharing – Load curve – Demand factor – Average load – Load factor – Diversity factor – Cost of electrical energy – General arrangement of power distribution – Economics in power plant selection and power generation. **Environmental Issues:** Effluents from power plants – Impact on environment – Pollutants – Pollution standards – Methods of Pollution control – Control of waste disposal and recovery – Waste disposal options for coal and nuclear power plants.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related toCOs
CO1	Know the working principles of steam power plants and analyzes its performance.	**PO1, PO2**
CO2	Explain the working of diesel and gas turbine power plant	**PO1, PO2**
CO3	Understand the working principles of nuclear power plant and safety measures	**PO1, PO2, PO7, PO12**
CO4	Explain the working of hydroelectric power plant and other renewable energy sources	**PO1, PO2, PO7, PO12**
CO5	Describe the economics, Energy management environmental issues of power generation	**PO1, PO2, PO7, PO11, PO12**

TEXT BOOKS:

1. P.K.Nag, -Power Plant Engineering‖, McGraw-Hill Education Pvt. Ltd., New Delhi, 4/e, 2014.
2. R.K Hegde, -Power Plant Engineering‖, Pearson Education, India, 1/e, 2015.

REFERENCE BOOKS:

1. M. M. El-Wakil, —Power Plant Technology‖ , Tata McGraw-Hill, New Delhi, 1/e, 2010.
2. Arora and S. Domkundwar, —A Course in Power Plant Engineering‖ , Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 6/e, 2012.
3. G.D.Rai, -Introduction to Power Plant Technology‖, Khanna Publishers, New Delhi, 3/e, 2012.
4. G.R. Nagpal and S.C. Sharma, -Power Plant Engineering‖, Khanna Publisher, New Delhi, 16/e, 2004.
5. R.K.Rajput, —A Text Book of Power Plant Engineering‖ , Laxmi Publications (P) Ltd., New Delhi, 5/e, 2016.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/112/107/112107291/
2. https://nptel.ac.in/courses/112/103/112103277/
3. https://nptel.ac.in/courses/112/107/112107216/
4. https://nptel.ac.in/courses/103/103/103103206/
5. https://nptel.ac.in/courses/112/103/112103243/

CO-PO MAPPING:

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

III B.Tech - VI Semester
(OPEN ELECTIVE – 2)

20OMEC361	**3D PRINTING CONCEPTS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the need for additive manufacturing technology.
2. To learn the design for additive manufacturing, CAD modelling and printing process.
3. To know the parameters and process of liquid and solid based additive manufacturing processes.
4. To explain the powder based additive manufacturing process and material jetting.
5. To demonstrate the post processing techniques and applications of AM process

UNIT –1: OVER VIEW OF ADDITIVE MANUFACTURING (AM) (9)

Additive V/s Conventional Manufacturing / CNC – Rapid prototyping – Rapid Tooling – Rapid manufacturing – Generic AM process – Development of AM technology –Use of layers – Classification of AM process – Basic steps for AM process – Differentiation between photopolymer, powder based, molten material, solid sheets and metal system.

UNIT –2: CAD MODELING AND DESIGN FOR ADDITIVE MANUFACTURING (9)

CAD Modeling: Preparation of CAD models – Data processing – STL format. **DFAM:** Part orientation and structure generation – Removal supports – Hollowing out parts – Undercuts – Inter locking features – Reduction of part and identification – Model slicing – Tool path generation. **Printing Processes:** Drop let formation technologies – Continuous mode–Drop on demand mode– Bio-plotter.

UNIT –3: LIQUID AND SOLID BASED ADDITIVE MANUFACTURING PROCESSES (9)

Principle, materials, properties, process and applications of Stereo lithography (SLA), Poly Jet, Fused Deposition Modeling (FDM), Laminated Object Manufacturing (LOM) and Ultrasonic Consolidation.

UNIT –4: POWDER BASED ADDITIVE MANUFACTURING PROCESSES (9)

Principle, materials, properties, process and applications of Selective Laser Sintering(SLS), Selective Laser Melting (SLM), Electron Beam Melting (EBM), Laser Engineered Net Shaping (LENS)and Binder Jetting.

UNIT –5: POST PROCESSING TECHNIQUES AND APPLICATIONS (9)

Product Quality: Support material removal– Surface texture improvements – Accuracy improvements – Aesthetic improvements – Preparation for use of pattern – Property enhancement using thermal and non-thermal techniques–Inspection and testing– Defects and their causes. **Applications:** Additive Manufacturingapplication of aerospace, electronics, healthcare, defense, automotive, construction, food processing, machine tool Business opportunities and future directions of AM.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related toCOs
CO1	Understand the need and development of additive manufacturing technology	**PO1,PO2**
CO2	Explain the design for additive manufacturing, CAD modeling, printing process	**PO1,PO2,PO3**
CO3	Illustrate the process of liquid and solid based additive manufacturing processes	**PO1,PO2,PO**
CO4	Explain the powder based additive manufacturing process and material jetting	**PO1,PO2,PO3**
CO5	Summarize the post processing techniques and applications of AM process	**PO1,PO2,PO3**

TEXT BOOKS:

1. Ian Gibson, David W. Rosen and Brent Stucker, —Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing‖ ,Springer,2/e,2015.
2. Chee Kai Chua, Kah Fai Leong and Chu Sing Lim, —Rapid Prototyping: Principles and Applications‖ , World ScientificPublishers,3/e,2010.

REFERENCE BOOKS:

1. T.S. Srivatsan and T.S. Sudarshan, —Additive manufacturing: Innovations, Advances and Applications‖ , Taylor& Francis Group, LLC.
2. Bandar AlMangour, —Additive Manufacturing of Emerging Materials‖ ,Springer,2018.
3. L. Jyothish Kumar, Pulak M. Pandey and David Ian Wimpenny, —3D Printing and Additive Manufacturing Technologies‖ , Springer Nature Singapore Pvt Ltd, 2019.
4. Rafiq Noorani, —3D Printing: Technology, Applications and Selection‖ , CRC Press, Taylor & FrancisGroup,2018.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/112/103/112103306/
2. https://nptel.ac.in/courses/112/104/112104162/
3. https://nptel.ac.in/courses/112/107/112107078/
4. https://nptel.ac.in/courses/112/107/112107077/

CO-PO MAPPING:

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

III B.Tech - VI Semester

(OPEN ELECTIVE – 2)

20OECE361	COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts.
4. Preparing the student for entry Advanced courses in computer networking.
5. Allow the student to gain expertise in some specific areas of networking.

UNIT –1: INTRODUCTION TO DATA COMMUNICATION (9)

Introduction: Network Topologies, Protocols & Standards, Layered Architecture LAN, WAN, MAN. OSI Reference Model, TCP/IP Reference Model, Guided and Unguided Media

UNIT –2: DATA LINK LAYER (9)

Data Link Layer: Design Issues, Framing – Error Control – Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, ARQ schemes, HDLC-PPP-Ethernet- IEEE 802.3,4,5 Protocols, Wireless LAN- the 802.11 Architecture and ProtocolStack-The802.11 Physical Layer- The802.11 MAC Sub layer Protocol-The 805.11 Frame Structure-Services.

UNIT –3: MAC LAYER AND ROUTING ALGORITHM (9)

The Medium Access Control Sub layer - The Channel Allocation Problem - Static Channel Allocation Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha- CSMA Protocols Collision - Free Protocols, Need for Internetworking, Design Issues, Addressing, Internet Protocol (IPv4/IPv6), Virtual Circuit and Datagram Networks, Routing Algorithms, Congestion Control Algorithms.

UNIT –4: TRANSPORT LAYER (9)

Transport layer: UDP, TCP, Congestion Control mechanisms, QOS, Techniques to improve QOS.

UNIT –5: COMMUNICATION INTERFACE AND COMMUNICATION BUSES (9)

Application Layer: Cryptography and network security, DNS, Electronic Mail, FTP, HTTP, SNMP, DHCP.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs relatedto COs
CO1	Independently understand basic computer network technology	**PO1, PO2,PO3**
CO2	Understand and explain Data Communications System and its components.	**PO1, PO2, PO3, PO4**
CO3	Analysis the different types of network topologies and protocols and Enumerate the layers of the OSI model and TCP/IP.	**PO1, PO2, PO3,**
CO4	Identify the different types of network devices and their functions within a network	**PO1, PO2, PO4**
CO5	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.	**PO1, PO2, PO4**

TEXT BOOKS:

1. Tanenbaum and David J Wetherall, —Computer Networks‖ , Pearson Edu., 5th Edition, 2010.
2. Behrouz A. Forouzan, Firouz Mosharraf, -Computer Networks: Top Down Approach‖ McGraw Hill Education, 1st Edition.

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, —Computer Networks - A Systems Approach‖ , Morgan Kaufmann/Elsevier, 5th Edition, 2011.
2. William Stallings, -Data & Computer Communication‖ , Pearson Education India, 10/e, 2014.
3. James F. Kurose, Keith W. Ross, —Computer Networking: A Top–Down Approach Featuring the Internet‖ , Pearson Education, 6th Edition, 2013.

REFERENCE WEBSITES:

1. https://www.javatpoint.com/computer-network-tutorial
2. https://www.sciencedirect.com/topics/computer-science/data communication network

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	2	3	2	3	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-
CO5	3	2	-	3	-	-	-	-	-	-	-	-
CO*	**2.8**	**2.6**	**2.3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV **B.Tech - VII Semester**

20CAI471A	**AI: KNOWLEDGE REPRESENTATIONS AND REASONING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: A course on Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the basic key concepts of AI based Knowledge Representation.
2. Apply the various ontological categories for substantial and non-substantial entities.
3. Acquire Knowledge representation for understanding Natural language semantics.
4. Identify the process classification and contexts
5. Understand fuzzy logic and process for reasoning contexts.

UNIT -1: KEYCONCEPTSAND LOGIC **(9)**

The Key Concepts: Knowledge, Representation, Reasoning, knowledge representation and reasoning, Role of logic.

Logic: Historical background, Representing knowledge in logic, Varieties of logic, Name, Type, Measures, Unity Amidst diversity

UNIT -2: BACKGROUND OF CATEGORIES **(9)**

Ontological categories, Philosophical background, Top-level categories, describing physical entities, Defining abstractions, Sets, Collections, Types and Categories, Space and Time

UNIT-3: KNOWLEDGE REPRESENTATIONS **(9)**

Knowledge Engineering, Representing structure in frames, Rules and data, Object-oriented systems, Natural language Semantics, Levels of representation

UNIT -4: PROCESSES AND CONTEXTS **(9)**

Processes: Times, Events and Situations, Classification of processes, Procedures, Processes and Histories, Concurrent processes, Computation, Constraint satisfaction, Change Contexts: Syntax of contexts, Semantics of contexts, First-order reasoning in contexts, Modal reasoning in contexts, Encapsulating objects in contexts.

UNIT-5: KNOWLEDGE SOUP **(9)**

Vagueness, Uncertainty, Randomness and Ignorance, Limitations of logic, Fuzzy logic, Non monotonic Logic, Theories, Models and the world, Semiotics Knowledge Acquisition and Sharing: Sharing Ontologies, Conceptual schema, accommodating multiple paradigms, Relating different knowledge representations, Language patterns, Tools for knowledge acquisition.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Describe the key concepts of AI based Knowledge Representation.	**PO1,PO2**
CO2	Use various Background categories for substantial and non-substantial entities	**PO1,PO3**
CO3	Apply Knowledge representation for understanding Natural language semantics.	**PO1,PO2,PO4**
CO4	Understand the process classification and contexts	**PO1,PO2,PO3, PO4**
CO5	Analyze fuzzy logic and process for reasoning contexts	**PO1,PO2,PO4, PO5**

TEXT BOOKS:

1. Knowledge Representation logical ,Philosophical, and Computational Foundations by John F. Sowa, Thomson Learning.
2. Knowledge Representation and Reasoning by Ronald J.Brachman, Hector J.Levesque, Elsevier.

REFERENCE BOOKS:

1. Brachman, Ron, "A Structural Paradigm for Representing Knowledge"(PDF).Bolt, Beranek, and Neumann Technical Report (3605). Archived (PDF) from the original onApril30,2020.
2. Hayes-Roth, Frederick; Donald Waterman; Douglas Lenat (1983).Building Expert Systems. Addison-Wesley. ISBN 978-0-201-10686-2.
3. Lenat, Doug; R. V. Guha (January 1990). Building Large Knowledge-Based Systems: Representation and Inference in theCycProject.Addison-Wesley.ISBN978-0201517521.

REFERENCE WEBSITE:

1. https://archive.nptel.ac.in/courses/106/106/106106140/
2. https://onlinecourses.nptel.ac.in/noc23_cs09/preview

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	**3**	**2.8**	**1.2**	**1.4**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

20CAI471B	INFORMATION SECURITY MANAGEMENT	L	T	P	C
		3	0	0	3

PRE-REQUISITES: A course on Computer Networks

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the different techniques of modern cryptography and classical cryptosystems
2. To provide the student to learn various block cipher and stream cipher using different algorithms.
3. Analyse the depth learning of finite fields and number theory also learn the cryptography.
4. Describe the principles of public key cryptosystems, hash functions and digital signature.
5. To Secure the network and studying about the layers by different concepts

UNIT-1: INTRODUCTION **(9)**

Introduction and Mathematical Foundations: Introduction, Overview on Modern Cryptography, Number Theory, Probability and Information theory.
Classical Cryptosystems: Cryptanalysis of Classical Cryptosystems, Shannon's Theory.

UNIT-2: SYMMETRIC ENCRYPTION **(9)**

Cryptanalysis of Symmetric key Ciphers: Linear Cryptanalysis, Differential Cryptanalysis, Other Cryptanalytic Techniques, Overview on S-Box Design Principles, Modes of Operation of Block Ciphers.

UNIT -3: ASYMMETRIC ENCRYPTION **(9)**

Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography-RSA Cryptosystem, Primary Testing, Factoring Algorithm, Discrete Logarithm Problem(DLP),Diffie Hellman Key Exchange, Rabin Cryptosystem, ElGamal Cryptosystem

UNIT-4: AUTHENTICATION SERVICES **(9)**

Integrity and Message Authentication, Cryptographic Hash Functions- Hash algorithms – SHA – HMAC,DigitalSignature-DigitalSignatureStandard(DSS),Authenticationapplications–Kerberos-
X. 9AuthenticationServiceSexret Sharing Schemes.

UNIT-5: SECURITY SERVICES **(9)**

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS-SSL Architecture, Message formats and transport layer security, Security at the Network Layer: IPSec Security, Intruders and Viruses, Firewalls.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understanding the types and techniques of Cryptography also achieve the Security Goals.	**PO1,PO2**
CO2	Different types of symmetric advanced standards and algorithms are learned	**PO1,PO2**
CO3	Primarily testing done by a Asymmetric Key Cryptography.	**PO1,PO2,PO3, PO4**
CO4	Design Secure applications like Digital Signature and Hash Functions.	**PO1,PO2,PO4**
CO5	Different types of Security coding and applications are learned	**PO1,PO2, PO5**

TEXT BOOKS:

1. Behrouz A Frozen, Debdeep Mukhopadhyay —Cryptography and Network Security‖ (3e) McGraw Hill, 2015.
2. William Stallings –Cryptography and Network Security‖,(7e) Pearson,2017.
3. Keith M.Martin,—Every day Cryptography‖ , Oxford, 2017.

REFERENCE BOOKS:

1. Bernard Meneges –Network Security and Cryptography‖, Cengage Learning, paper back 2018.

REFERENCEWEBSITES:

1.https://nptel.ac.in/courses/106/105/106105031/lecture
2.https://nptel.ac.in/courses/106/105/106105162/lecture

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	-	-	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**2**	**2**	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

20CAI471C	**MACHINE LEARNING FOR DATA SCIENCE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Apply various analytics techniques in a high dimensional data
2. Understand and apply dimensionality reduction techniques and its application.
3. Apply the link analysis techniques to perform social media analysis.
4. Develop machine learning models to explore hidden knowledge from the historical data.
5. Describe the various clustering algorithms for massive data problem

UNIT -1: INTRODUCTION **(9)**

High-Dimensional Space: The Law of Large Numbers, the Geometry of High Dimensions, Properties of the Unit Ball, Generating Points Uniformly at Random from a Ball, Gaussians in High Dimension.

UNIT -2: SINGULAR VALUE DECOMPOSITION **(9)**

Singular Vectors, Singular Value Decomposition (SVD), Best Rank-k Approximation, Left Singular Vectors, Power Method for Singular Value Decomposition, Singular Vectors and Eigen vectors, Applications of Singular Value Decomposition.

UNIT -3: RANDOM WALKS **(9)**

Stationary Distribution, Markov Chain Monte Carlo, Areas and Volumes, Convergence of Random Walks on Undirected Graphs, Electrical Networks and Random Walks.

UNIT -4: GENERATE OF DATA **(9)**

Introduction, The Perceptron algorithm, Kernel Functions, Generalizing to New Data, Over fitting and Uniform Convergence, Support-Vector Machines, Deep Learning, Further Current Directions.

UNIT -5: MASSIVE DATA PROBLEMS **(9)**

Frequency Moments of Data Streams, Matrix Algorithms using Sampling**,** Clustering: Introduction, k-Means Clustering, k-Center Clustering, Finding Low-Error clustering, Spectral Clustering.

Total Hours:45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Demonstrate various analytics techniques in a high dimensional data.	**PO1,PO2**
CO2	Apply dimensionality reduction techniques and its application	**PO1,PO2,PO3**
CO3	Apply the link analysis techniques to perform social media analysis	**PO1,PO2, PO3,PO4**
CO4	Create machine learning models to explore hidden knowledge from the historical data.	**PO1,PO2,PO3,PO4**
CO5	Analyze about of data streams and clustering Algorithm	**PO1,PO2, PO5**

TEXT BOOKS:

1. Foundations of Data Science, Avrim Blum, John Hopcroft, and Ravindran Kannan, 2018 edition. (freeonline).

REFERENCE BOOKS:

1. Doing Data Science, Straight Talk From The Frontline, Cathy O'Neiland Rachel Schutt,' Reilly(2014).
2. Data Mining: Concepts and Techniques‖ ,Third Edition,Jiawei Han,Micheline Kamber and Jian Pei, ISBN 0123814790,(2011).

REFERENCE WEBSITES:

1. https://archive.nptel.ac.in/courses/106/106/106106179/
2. https://onlinecourses.nptel.ac.in/noc21_cs78/preview

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-
CO5	3	2	-	3	3	-	-	-	-	-	-	-
CO*	**3**	**2.4**	**2**	**1.6**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

		L	T	P	C
20CAI472A	**ARTIFICIAL INTELLIGENCE FOR CYBER SECURITY**	**3**	**0**	**0**	**3**

PRE-REQUISITES: NIL

Course Educational Objectives:

1. To learn the need of AI for Cyber Security
2. To learn the detection of DDOS using AI techniques
3. To study the Detection of malicious in web pages and URLs
4. To learn the intrusion detection using Neural Networks
5. To learn the various applications of AI to detect cyber attacks

UNIT -1: INTRODUCTION TO CYBERSECURITY AND AI IN DDOS (9)

Introduction–Problems that AI Solves–Why AI in Cyber security–Current Cyber Security Solutions-classification problem- clustering problems–SVM–ANNs. Time series – Types of Time series – Time Series analysis in Cyber Security – Detecting DDOS with Time Series – Predicting DDOS attacks – Ensemble Techniques for Cyber security-Types of Ensemble Algorithms.

UNIT -2: DETECTION OF MALICIOUS WEB PAGES, URLS (9)

URL Black listing–Drive by download URL-Command and Control URLs –Phishing URLs –Using Heuristics to detect Malicious Pages – Data for the analysis – Feature Extraction – Lexical Features – Web Content based Features – Host based features–site Popularity features.

Unit -3 : CAPTCHA ,SCAN DETECTION AND MALICIOUS EVENT DETECTION (9)

Using AI to crack CAPTCHA – Types of CAPTCHA – ReCAPTCHA – Breaking a CAPTCHA – Solving CAPTCHA with neural network - Machine Learning in Scan Detection - Machine-Learning Applications in Scan Detection Context based Malicious event detection–Adware–Bots–Bugs–Ransomeware–Rootkit– Spyware–Trojan horses –Viruses–Worms–Malicious Injections in Wireless networks.

UNIT -4: AI AND IDS (9)

Architecture of IDS based on Neural networks –Intelligent flow based IDS - Multi-Agent IDS – AI based Ensemble IDS–Machine Learning in Hybrid Intrusion Detection Systems-Machine-Learning Applications in Hybrid Intrusion Detection: Anomaly- Misuse Sequence Detection System-Parallel Detection System.

UNIT -5: AI AND MAIL SERVER (9)

Types of Mail Server–Data Collection from mail server–Naïve Bayes theorem to detect spam–Laplace smoothing–Factorization Techniques to covert text based emails to numeric values– Logistic regression to spam filters –Anomaly detection techniques for SMTP and HTTP.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the cyber threats, attacks and vulnerabilities and its defensive mechanism	**PO1,PO2**
CO2	Understand and implement various AI techniques to detect cyber attacks	**PO1,PO2**
CO3	Classify and implement the Detection of malicious web pages, URLs	**PO1,PO2,PO3, PO4**
CO4	Able to identify recent challenges in AI related to cyber security.	**PO1,PO2,PO4**
CO5	Develop new security solutions to the real time applications	**PO1,PO2, PO5**

TEXT BOOKS:

1. Hands-On Machine Learning for Cyber Security: Safeguard your system by making your machine intelligence using the python ecosystem, Soma Harder, Sinan Ozdemir, Packt Publishing Ltd, 2018.
2. The state of the Art in Intrusion Detection System, AI-Sakib Khan Pathan, CRC Press, Taylor & Francis Group,2014
3. Data Mining and Machine Learning in Cyber Security, Sumeet Dua and Xian Du, CRCPress,2011.

REFERENCE BOOKS:

1. Cyber security for Dummies, Brian Underdahl,Wiley,2011
2. Cryptography and Network security, Behrouz A.Forouzan, Debdeep Mukhopadhyay, Mcgraw Hill Education,2nd Edition,2011

REFERENCE WEBSITES:

1. https://archive.nptel.ac.in/courses/106/102/106102220/
2. https://www.ibm.com/security/artificial-intelligence

CO PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	-	-	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

20CAI472B	COMPUTER VISION IN HEALTHCARE APPLICATION	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Study the concept of computer vision
2. To get the knowledge of computer vision foundations and applications
3. To understand Image formation and pre-processing
4. Implement the 3D object recognition
5. Illustrate Computer vision in health care applications

UNIT -1: INTRODUCTION TO COMPUTER VISION (9)

Brief history of Computer Vision–Image Processing, Machine Learning–Information Retrieval–Neuro science–Robotics–Speech–Cognitive Sciences–Graphics, Algorithms, Systems and Theory– Pattern Recognition– Computer Graphics.

UNIT -2: COMPUTER VISION FOUNDATIONS (9)

Image Processing- Colour-Linear Algebra Primer- Pixels and Filters- Edge Detection-Features and Fitting-Feature Descriptors-Image Resizing-Segmentation-Semantic Segmentation - Clustering - Object recognition - Dimensionality Reduction - Face Identification –Visual Bag of Words-Object Detection from Deformable Parts-Semantic Hierarchies and Fine Grained Recognition -Motion-Tracking-Deep Learning

UNIT -3: IMAGE FORMATION (9)

Geometric primitives and transformations–Photo metric image formation–The digital camera–Point operators–Linear Filtering–Geometric transformations –Global optimization. **Image pre-processing-**Feature detection and matching – Segmentation – Edge detection - 2D and 3D feature based alignment–Pose estimation–Geometric intrinsic calibration–Triangulation–Two-Frame Structure from motion–Factorization–Bundle adjustment–Constrained Structure and Motion–Dense motion estimation.

UNIT 4: 3D VISION AND COMPUTER VISION FOR ASSISTING HEALTHCARE APPLICATIONS (9)

Methods for 3DVision-3D reconstruction–Image based rendering ,Image Recognition–Object Detection–Space, Instance and Category Recognition–Recognition Databases and test sets. Computer Vision to see-Computer Vision for Cognition-Computer Vision for physical rehabilitation and training - Computer Vision for CAD systems in surgery - Computer Vision for human-machine interaction-Computer Vision for Ambient Assisted Living-Ego centric(firstperson)vision.

UNIT -5: HEALTH CARE APPLICATIONS (9)

Analysis of Medical Image-Computer Vision for Predictive Analytics and Therapy-Fundamental Algorithms for Medical Images-Machine Learning Algorithms for Medical Images–Deep learning approaches for healthcare applications.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Ability to understand concept of computer vision	**PO1,PO2**
CO2	Acquire knowledge of computer vision foundations and applications.	**PO1,PO2,PO3**
CO3	Analyzse Image formation and pre-processing Techniques	**PO1,PO2,PO3, PO4**
CO4	Implement 3D Vision And Computer Vision For Assisting Healthcare	**PO1,PO2,PO4**
CO5	Implement Computer vision in health care applications.	**PO1,PO2, PO5**

TEXTBOOKS:

1. Ranjay Krishna,"Computer Vision:Foundations and Applications",Standford University,
2. Richard Szeliski,—ComputerVision: Algorithms and Applications,Springer 2011

REFERENCEBOOKS:

1. Simon J. D.Prince, Computer Vision: Models, Learning, and Inference, Cambridge UniversityPress,2012.
2. Forsyth DA and Ponce,—Computer Vision: A Modern Approach, Prentice Hall 2003
3. Mark Nixon and Alberto S.Aquado, Feature Extraction& Image Processing for Computer Vision, Third Edition, Academic Press, 2012.
4. Forsyth DA and Ponce,—Computer Vision: A Modern Approach, Prentice Hall 2003.

REFERENCEWEBSITES:

1. https://www.coursera.org/articles/ai-in-health-care
2. https://www.coursera.org/learn/ai-for-medical-diagnosis

CO PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**1.6**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

20CAI472C	STATISTICAL NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Finite Automata

COURSE OUTCOMES:

1. Describe the concept of morphological analyzer using finite state automata concepts
2. Explain different linguistic components of speech processing
3. Apply Early algorithm for providing suitable grammar and words.
4. Analyze the usage of tagger to semantically tag the words using WordNet.
5. Determine various application for information Extraction

UNIT -1: MORPHOLOGY AND PART-OF SPEECH PROCESSING (9)

Introduction –Regular Expressions and Automata- Non-Deterministic FSAs. Tranducers – English Morphology – Finite-State Morphological Parsing - Porter Stemmer – Tokenization Detection and Correction of Spelling Errors. N-grams – Perplexity - Smoothing - Interpolation - Backoff Part-of-Speech Tagging – English Word Classes – Tag sets – Rule Based - HMM - Transformation-Based Tagging - Evaluation and Error Analysis. Hidden Markov and Maximum Entropy Models

UNIT -2: SPEECH PROCESSING (9)

Phonetics – Articulatory Phonetics - Phonological Categories - Acoustic Phonetics and Signals - Speech Synthesis – Text Normalization – Phonetic and Acoustic Analysis – Diphone Waveform synthesis – Evaluation- Automatic Speech Recognition –Architecture - Hidden Markov Model to Speech - MFCC vectors - Acoustic Likelihood Computation - Evaluation. Triphones – Discriminative Training - Modeling Variation. Computational Phonology-Finite-State Phonology – Computational Optimality Theory - Syllabification - Learning Phonology and Morphology

UNIT -3: SYNTAX ANALYSIS (9)

Formal Grammars of English – Constituency - Context-Free Grammars –Grammar Rules – Tree banks - Finite-State and Context-Free Grammars - Dependency Grammars. Syntactic Parsing – Parsing as Search - Ambiguity - Dynamic Programming Parsing Methods – CKY Earley and Chart Parsing- Partial Parsing-Evaluation. Statistical Parsing – Probabilistic Context-Free Grammars – Probabilistic CKY Parsing of PCFGs –Probabilistic Lexicalized CFGs – Collins Parser Language and Complexity -The Chomsky Hierarchy -The Pumping Lemma

UNIT -4: SEMANTIC AND PRAGMATIC INTERPRETATION (9)

Representation of Meaning – Desirable Properties - Computational Semantics -Word Senses - Relations Between Senses – WorldNet - Event Participants- Proposition Bank - Frame Net – Metaphor. Computational Lexical Semantics – Word Sense Disambiguation- Supervised Word Sense Disambiguation - Dictionary and Thesaurus Methods- Word Similarity - Minimally Supervised WSD - Hyponymy and Other Word Relations - Semantic Role Labeling - Unsupervised Sense Disambiguation.

UNIT -5: APPLICATIONS (9)

Information Extraction – Named Entity Recognition - Relation Detection and Classification – Temporal and Event Processing - Template-Filling - Biomedical Information Extraction. Question Answering and Summarization -Information Retrieval -Factoid Question Answering – Summarization- Single and Multi-Document Summarization - Focused Summarization - Evaluation.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Use linguistic components of speech processing	**PO1,PO2**
CO2	Understand concept of Speech processing using finite state automata concepts.	**PO1,PO2**
CO3	Apply Early algorithm for providing suitable grammar and words.	**PO1,PO2,PO3, PO4**
CO4	Apply usage of tagger to semantically tag the words using WordNet.	**PO1,PO2,PO4**
CO5	Determine the various applications of information extraction	**PO1,PO2,PO5**

TEXT BOOKS:

1. Jurafsky and Martin, -Speech and Language Processing‖, Pearson Prentice Hall, Second Edition, 2008.
2. Christopher D. Manning and Hinrich Schütze, —Foundations of Statistical Natural Language Processing‖ , MIT Press, 1999.

REFERENCE BOOKS:

1. Stevan Bird, —Natural Language Processing with Python‖, Shroff, 2009.
2. James Allen, —Natural Language Understanding‖, Addison Wesley, Second Edition, 2007.
3. Nitin Indurkhya, Fred J. Damerau, -Handbook of Natural Language Processing‖, (Chapman& Hall/CRC Machine Learning & Pattern Recognition), Second Edition, 2010.

REFERENCE WEBSITE:

1. http://peterindia.net/AILinks.html

CO PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	-	-	3	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester

20CAI473A	AI IN SPEECH PROCESSING	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. Describe the basics of speech processing concepts
2. Evaluate different Speech modeling mechanism
3. Apply AI based Speech modeling
4. Apply AI based recognition approaches.
5. Determine various speech synthesis methods

UNIT-1: INTRODUCTION (9)

Basic Concepts: Speech Fundamentals: Articulatory Phonetics–Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short- Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT-2: SPEECH ANALYSIS (9)

Speech Analysis: Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures–mathematical and perceptual–Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization–Dynamic Time Warping, Multiple Time–Alignment Paths.

UNIT-3: SPEECH MODELING (9)

Speech Modeling: Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence–Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.

UNIT-4: SPEECH RECOGNITION (9)

Speech Recognition: Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system–acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.

UNIT-5: SPEECH SYNTHESIS (9)

Speech Synthesis: Text-to-Speech Synthesis: Concatenative and wave form synthesis methods, sub-word units for TTS, intelligibility and naturalness–role of prosody, Applications and present status.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand basics of speech processing concepts	**PO1,PO2,PO3**
CO2	Evaluate different Speech modelling mechanism	**PO1,PO2,PO3**
CO3	Implement AI based Speech modelling	**PO1,PO2**
CO4	Apply AI based recognition approaches	**PO1,PO3, PO4**
CO5	Acquire Various speech synthesis methods	**PO1,PO2,PO3,PO4, PO5**

TEXT BOOKS:

1. Daniel Jurafsky and James H Martin, —Speech and Language Processing–An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition‖, Pearson Education, 2008.
2. Speech and Language Processing (3rdedition), Dan Jurafsky and James H.Martin, October16, 2019.
3. Lawrence Rabiner and Biing-Hwang Juang, –Fundamentals of Speech Recognition‖, Pearson Education, 2008.
4. Steven W. Smith, —The Scientist and Engineer's Guide to Digital Signal Processing‖, California Technical Publishing, 2011.

REFERENCE BOOKS:

1. Thomas F Quatieri,–Discrete-Time Speech Signal Processing–Principles and Practice‖, Pearson Education, 2002
2. Claudio Becchetti and Lucio Prina Ricotti, –Speech Recognition‖, John Wiley and Sons, 1999.
3. Bengold and Nelson Morgan, –Speech and audio signal processing‖, processing and perception of speech and music, Wiley-India Edition, 2006.
4. Frederick Jelinek, -Statistical Methods of Speech Recognition‖, MIT Press,1998
5. Himanshu Mohan, Megha Yadav,"Speech Recognition System and its Application‖, LAPLAMBERT Academic Publishing,2019.

REFERENCE WEBSITES:

1. https://archive.nptel.ac.in/courses/117/105/117105145/
2. http://onlinecourses.nptel.ac.in/noc22_ee117/preview

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	2	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**2.2**	**1.0**	**0.8**	**2**	-	-	-	-	-	-	-	-

IV B.Tech - VII Semester

20CAI473B	SMART SENSING STRUCTURES AND AI	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Describe the fundamentals of sensors and micro machining.
2. Study about sensitive and integrated conditioning output characteristics
3. Identify Sensor technologies for communications systems.
4. Apply different routing protocols for Wireless Sensing Networks.
5. Analyze the adoption of smart sensor in AI applications.

UNIT-1: SMART SENSOR BASICS (9)

Nature of Sensors, Integration of Micro machining and Microelectronics, Micro machining-Bulk Micromachining, Wafer Bonding, Surface Micro machining, The LIGA Process- Dry Etching Processes–Micro milling-Lasers in Micromachining. MEMS-software tools.

UNIT-2: SENSOR OUTPUT CHARACTERISTICS (9)

Sensing Technologies, Digital Output Sensors, Noise/Interference Aspects, Sensitivity Improvement, Amplification and Signal Conditioning-Integrated Signal Conditioning-Digital Conversion-On-Line Tool for Evaluating a Sensor Interface Design

UNIT-3: COMMUNICATIONS FOR SMART SENSORS (9)

Communications for Smart Sensors: Standards, Automotive Protocols, Industrial Networks, Protocols in Silicon, Transitioning Between Protocols - Control Techniques- State Machines, Fuzzy Logic, Neural Networks, Adaptive Control, RISC Versus CISC, Impact of Artificial Intelligence.

UNIT-4: WIRELESS SENSING (9)

Wireless Data and Communications-Wireless Sensing Networks-Industrial Wireless Sensing Networks- RF Sensing- Telemetry- RF MEMS- Application Example, MEMS- Actuators, Micro machined Structures, Packaging, Testing, and Reliability Implications of Smarter Sensors.

UNIT-5: APPLICATIONS OF SENSOR IN AI (9)

Automotive Applications, Industrial(Robotic) Applications ,Consumer Applications, Structural Health Monitoring, Building Automations Systems, Automotive, aircraft, portable consumer, Automated Medical Image Analysis in Digital Mammography, Lung Cancer Detection and Diagnosis based on Deep Learning Models Evaluation

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the fundamentals of sensors and micro machining.	**PO1,PO2**
CO2	Understand sensitive and integrated conditioning output characteristics	**PO1,PO2**
CO3	Study Sensor technologies for communications systems.	**PO1,PO2**
CO4	Analyze routing protocols for Wireless Sensing Networks	**PO1,PO2,PO3, PO4**
CO5	Apply adoption of smart sensor in AI applications	**PO1,PO2,PO4**

TEXT BOOKS:

1. Understanding smart sensors, Randy Frank,2018
2. Artificial Intelligence and Internet of Things, Lalit Mohan Goyal, Tanzila Saba, Amjad Rehman, Souad Larabi-Marie-Sainte, 2021
3. Life3.0,MaxTegmark,2017

REFERENCE BOOKS:

1. Smart Sensors and Devices in Artificial Intelligence, Xuechao Duan,DanZhang,2021.
2. Smart Sensors and Systems, HirotoYasuura,YongpanLiu,Chong-MinKyung,2015.

REFERENCE WEBSITES:

1. https://archive.nptel.ac.in/courses/112/104/112104173/
2. https://onlinecourses.nptel.ac.in/noc23_ae19/preview

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	-	-
CO5	3	3	-	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**	**2.0**	**1.4**	**2**	-	-	-	-	-	-	-	-

IV B.Tech - VII Semester

20CAI473C	FUNDAMENTAL OF INTERNET OF THINGS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Understand the basic concept of IoT and its domain structure
2. To Describe the various system components of IoT
3. To integrate the design of IOT using appropriate Software
4. To Acquire the knowledge of IOT devices
5. To study Use of devices, gateway sand data management in IoT

UNIT-1: INTRODUCTION AND CONCEPTS (9)

Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT–IoT Enabling Technologies– IoT levels & Deployment Templates.

Domain Specific IoTs: Introduction–Home Automation–Cities, Environment–Energy–Retail, Logistics–Agriculture, Industry, Health & Lifestyle.

UNIT-2: IOT AND M2M (9)

Introduction –M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT System management with NETCONF, YANG, Need for IoT Systems Management –Simple network Management protocol (SNMP)–Network operator requirements, NETCONF, YANG, IOT systems management with NETCONF, YANG–NETOPEER.

UNIT-3: DESIGN METHOLOGY INTERNET OF THINGS (9)

IoT Platforms Design Methodology, Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring – Motivation for Using Python – IoT Systems, logical Design using Python, installing Python, Python Data Types& Data Structures, Control flow, functions, Modules, Packages, File Handling, Data/Time Operations, Classes, Python Packages of Interest for IoT.

UNIT-4: IOT PHYSICAL DEVICES & ENDPOINT (9)

What is an IOT devices, Exemplary Devices: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python–Other IoT Devices.

UNIT-5: IOT PHYSICAL SERVERS &CLOUD OFFERINGS (9)

Introduction to Cloud Storage Models & Communication APIs, WAMP, Auto Bahn for IoT, Xively Cloud for IoT, Python Web Application Framework, Django, Designing a REST ful Web API, Amazon Web services for IoT, SkyNet IoT Messaging Platform.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the basic concept of IoT and its domain structure	**PO1,PO2,PO3**
CO2	Describe the various system components of IoT	**PO1,PO2,PO4**
CO3	Develop the design of IOT using appropriate Software	**PO1,PO2,PO3 PO4**
CO4	Acquire the knowledge of IOT devices	**PO1,PO2,PO3**
CO5	Use of devices, gateway sand data management in IoT	**PO1,PO2,PO4,PO5**

TEXT BOOK:

1. ArshdeepBahga,VijayK.Madisetti,–Internet of Things‖,A HAND SON APPROACH,Universities Press,2014

REFERENCEBOOKS:

1. AdrianMcewen,HakinCassimally,"DesigningThe Internet of Things",WEILEYPublications,2015
2. JanHoller,VlasiosTsiatsis,CatherineMulligan,Stefan Avesand, David Boyle,Stamatis Karnouskos,"From Machine-to-Machine to the Internet of Things",Academic Press,2014

REFERENCE WEBSITES:

1. https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cs63/
2. https://onlinecourses.swayam2.ac.in/arp19_ap52/preview

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	1	2	2	-	-	-	-	-	-	-	-	3	2
CO2	1	3	-	2	-	-	-	-	-	-	-	2	3
CO3	3	2	2	2	-	-	-	-	-	-	-	3	3
CO4	3	1	2	-	-	-	-	-	-	-	-	2	2
CO5	3	1	-	2	2	-	-	-	-	-	-	2	2
CO*	**2.4**	**1.8**	**1.6**	**1.2**	**0.4**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**

IV B.Tech - VII Semester

20CSE474	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		3	0	0	3

PRE-REQUISITES: A course on Java

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the characteristics of mobile applications
2. To gain knowledge about the intricacies of UI required by mobile applications.
3. To study about the design aspects of mobile application
4. To identify the different options in designing the mobile application
5. To evaluate the techniques for the installation of mobile applications and delivery via various channels.

UNIT-1: JAVA REVIEW & INTRODUCTION AND INSTALLATION OF ANDROID TOOLS (6)

Java Review –OOPs Concepts - Method Overriding -Android Overview-History-Android Versions - Android Flavors -Android Stack – Linux - Native Layer -Dalvik Virtual Machine -Application Framework – Applications - Installation and Use of Android Tools - Installing JDK -Installing the Android SDK - Anatomy of an Android Project - Drawable Resources - Steps in Building Projects in Android- Android Emulator.

UNIT-2: USER INTERFACE ANDROID BUILDING BLOCKS AND USER INTERFACE (6)

XML Introduction - Need of XML for Android User Interface – Creating user interface using XML – Drag and Drop methods - Overview of Android Building Blocks: Activities - Activity Life Cycle – Methods in Activity Life Cycle. Services - Services Life Cycle –Intents - Types – Creation – Content Providers –Application Context - Android User Interface - Types and creation - Views and Layout-The Status Activity Layout - The Status Activity Java Class - Logging Messages in Android-Threading in Android –Examples using Threading.

UNIT-3: APPLICATION DESIGN FRAGMENTS-INTENTS-ACTION BAR-SERVICES AND CONTENT PROVIDERS (6)

Fragments: Definition – Types - Fragment Life cycle – Creating a Fragment in android -Dynamically Adding Fragments - Example. Intents: Definition – Usage of Intends –Creation of Indents with example program - Action Bar - Preferences and Action Bar -SharedPreferences-UpdatingStatusFragment-AndroidFilesystems-ContentProviders - Overview – Role of Content Providers - Databases on Android - SQLite –Status Contract Class-Update Refresh Service –Content Provider Example Program.

UNIT-4: LISTS - ADAPTERS AND BROADCAST RECEIVERS (6)

Greedy Method: General Method–Applications-Job Sequencing with Deadlines-Knapsack Problem-Minimum Cost Spanning Trees- Single Source Shortest Path Problem. Backtracking: General Method–Applications-N-Queens Problem-Sum of Subsets Problem- Graph Coloring-Hamiltonian Cycles.

UNIT-5: APPLICATIONS WIDGETS-NETWORKING-WEB OVERVIEW-INTERACTION AND SENSORS (6)

App Widgets: Content Providers through Widgets - Networking and Web Overview: HTTP API - Apache HTTP Client - Http URL Connection - Networking in Background using AsyncTask and AsyncTask Loader Classes.

Interaction and Animation: Live Wallpaper and Handlers-Sensors: Sensor API in Android-Motion Sensor-Position Sensor-Environmental Sensor-Sensor Values-Sensor Manager Class - Sensor Class - Sensor Event class -Sensor Event Listener interface-Compass Accelerometer and orientation Sensors-Sensor Examples.

List of Demo/Experiments (Only for Skill Enhancement, Not for Exams) (15)

1. Develop an android application to display the internal keyboard in the emulator.
2. Write any Two Tools for developing mobile application.
3. Write an android program to display a message in the toast
4. Write an android program to input a text through a text and the same must be displayed in the toast when a button is clicked on the screen
5. Develop an application to perform 5 arithmetic operations: Addition-Subtraction-Multiplication-Division and Modulo operation with necessary user interface creation
6. Develop an android application to process a student mark list by creating proper UI using the necessary controls
7. Develop an android application to demonstrate the concept of Fragments in Android
8. Write an android application to create a calculator
9. Create an android UI that consists of Different Departments of a company namely Marketing and HR. If the user clicks on any department, it should show details of that department
10. Design an android application to display a list of items on the android screen. If the user clicks any one of the list items a dialogue box should show that the user has clicked that particular item
11. Design an android application to create a service that shows the service is running in the background in the form of a toast
12. Develop an android application if the user clicks the button its navigates to the next activity (Using Intents)

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		**POs related to COs**
CO1	Recollect the essential concepts of java and get familiar with android basics and installation.	**PO1,PO2**
CO2	Create User Interfaces with various Layouts and views using android building blocks.	**PO1,PO2,PO4**
CO3	Write programs on fragments-intents	**PO1,PO2,PO3,PO3**
CO4	Use the applicability of lists based on adapters and broadcast receivers	**PO1,PO2,PO3,PO4**
CO5	Develop widgets-wallpaper and sensor programs for android application development	**PO1,PO2,PO3**

TEXT BOOKS:

1. Learning Android, Marko Gargenta &Masumi Nakamura, O'Reilly – IIEdition.
2. Android Programming for Beginners, John Horton, PACKT publishers.

REFERENCE BOOKS:

1. Android application Development, Black Book, Pradeep Kothari, Dreamtech.
2. Head First Android Development: A Brain- Friendly Guide,2/e, Dawn Griffiths and David Griffiths, O'Reilly.
3. Android System Programming, Roger Ye, PACKT publishers.
4. Programming Android, Zigurd Mednieks, Laird Dornin, G. Blake Meike & Masumi Nakamura, O'Reilly.
5. Android Application Development Allin One for Dummies, 2ndEdition, Barry Burd, Wiley.

REFERENCE WEBSITE:

1. https://www.openxcell.com/mobile-app-development/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	1	-	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**-**	**1.67**	-	-	-	-	-	-	-	-

IV B.Tech - VII Semester

20CAI474	INDUSTRY INTERNSHIP/COMMUNITY SERVICE PROJECT–EVALUATION	L	T	P	C
		0	0	0	2

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training in industry.
2. The course is designed so as to expose the students to industry environment and to take upon-site assignment as trainees or interns.

SCHEME OF INDUSTRY INTERNSHIP:

1. At the end of the Industrial Internship, the candidate shall submit a certificate from the organization where he/she has undergone industrial training and also a brief report.
2. An industry internship report to be submitted by the individual and along with the internship certificate provided by the organization, which will be reviewed and evaluated by a Committee constituted by the Head of the Department.
3. The evaluation for 100 marks will be carried out internally based on this internship report and a Viva Voce Examination will be conducted by a Departmental Committee constituted by the Head of the Department/Institution.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate in-depth knowledge on the selected topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for selected work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen selected problem.	**PO3**
CO4	Under take investigation of selected problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for selected work	**PO5**
CO6	Apply selected information for sustain able development tof the society.	**PO6**
CO7	Understand the impact of selected concept in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the selected work.	**PO8**
CO9	Function effectively as individual and a member in the internship.	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting internship report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the internship.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the selected topic.	**PO12**

CO-POMAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	3	-	-	-	-	-	-
CO7	-	-	-	-	-	-	3	-	-	-	-	-
CO8	-	-	-	-	-	-	-	3	-	-	-	-
CO9	-	-	-	-	-	-	-	-	3	-	-	-
CO10	-	-	-	-	-	-	-	-	-	3	-	-
CO11	-	-	-	-	-	-	-	-	-	-	3	-
CO12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

IV B.Tech - VII Semester

20HSM471A	INDUSTRIAL ENGINEERING AND PSYCHOLOGY	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the concepts and characteristics of personnel Management.
2. To understand the organizational structures and plant layout.
3. To know the basic need of work and method study and industrial psychology.
4. To learn the Forecasting and process planning concepts.
5. To study the inventory control and personnel management in an industry.

UNIT–1: CONCEPTS OF MANAGEMENT (9)

Management : Importance of administration and organization–Managerial skills, policies, and objectives – Management contribution of FW Taylor, Henry Foyal and Gilberth–Principles, types, process, levels and functions of management–Management chart–Concepts in project management and MIS–Industrial ownership – Responsibilities of supervisor/foreman–Leadership concepts. **Personnel Management:** Concepts, recruitment, selection, training, job evaluation, merit rating, wage plans, incentives, safety, housekeeping, welfare measures, promotion, lay-off, transfer and discharge.

UNIT–2: ORGANIZATIONAL STRUCTURES AND PLANT LAYOUT (9)

Organization: Concept, importance, characteristics and process of organization–Organization theory, principle, structure, chart and committees – Project, matrix andinformalorganization–Departmentation–Authorityanddelegation–Groupdynamics – Organizational change, development and conflict – Leadership and communication system. **Plant Layout:** Types, flow pattern, work station, storage, layout and factory design.

UNIT–3: WORK STUDY AND INDUSTRIAL PSYCHOLOGY (9)

Work and method study – Ergonomics principles – Process chart symbols – Flow process, activity chart, flow and string diagram – Operation analysis and motion and economy–Design and layout of work place– Therbligs –SIMO chart – Time study – Standard data –Analyticalestimating–PerformanceRating–Allowances–PMTS.**Industrial Psychology:** Concept, individuals and group–Motivation theories–Hawthorne experiment–Morale and motivation–Environmental condition – Industrial fatigue.

UNIT–4: PRODUCTION PLANNING AND CONTROL (9)

Productivity: I/O model– Factors affecting the productivity–Productivity resources and measures. **Production Planning:** Continuous and intermittent production –Job, open and closed job shop–Large projects–Forecasting–Process planning – Batch quantity–Tool control and production–Loading, scheduling, dispatching and routing and flow control.

UNIT–5: MATERIALS MANAGEMENT AND INVENTORY CONTROL (9)

Materials Management: Concepts–Procurement–Purchase and order–Buying techniques. **Inventory Control:** Classification–Objectives –Functions–Economic order quantity (EOQ) – Inventory models– ABC analysis–Material requirements planning (MRP)–Manufacturing resource planning (MRP-II).

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand the concepts of management and characteristics of Administration and organization	**PO1,PO2, PO12**
CO2	Explain the organizational structures and plant layout for productivity Improvements	**PO1,PO2, PO12**
CO3	Describe the basic need of work study, method study, time study and industrial psychology	**PO1,PO2, PO12**
CO4	Explain the Forecasting, Process planning and control of manufacturing a product	**PO1,PO2,PO12**
CO5	Demonstrate the inventory control and personnel management in an industry	**PO1,PO2,PO11,PO12**

TEXT BOOKS:

1. O.P.Khanna,–Industrial Engineering and Management, Dhanpat Rai Publishing Company(P)Ltd., NewDelhi, 17/e,2010.
2. Pravin Kumar, -Industrial Engineering and Management, Pearson Education, NewDelhi, 1/e,2015.

REFERENCE BOOKS:

1. S.N.Chary, –Production and Operations Management, TataMc Graw- Hill Education Pvt.Ltd., Noida, 6/e,2019.
2. William JStevenson, –0perations Management, TataMc Graw-Hill Education Pvt.Ltd., Noida, 12/e,2018.
3. Shailendra Kale, –Production and Operations Management, TataMc Graw-Hill Education Pvt.Ltd., Noida, 1/e, 2013.
4. Kanishka Bedi,–Production and Operations Management,Oxford University Press, India, 3/e,2013.
5. Harold T Amrine, John A Ritchey, Colin LMoodie and Joseph FKmec, -Manufacturing Organization and Management, Pearson Education, New Delhi, 6/e,2004.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/112/107/112107292/2.
2. https://nptel.ac.in/courses/112/107/112107142/3.
3. https://nptel.ac.in/courses/112/107/112107143/

CO-PO MAPPING:

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

IV B.Tech - VII Semester

20HSM471B	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the fundamental aspects of intellectual property Rights.
2. To disseminate knowledge on fundamentals of patent, transfer and infringement.
3. To introduce the fundamental aspects of copyrights and trademarks.
4. To acquire knowledge on geographical indication, industrial design and IC layout.
5. To disseminate knowledge on intellectual property management.

UNIT–1: INTRODUCTION TO INTELLECTUAL PROPERTY (9)

Definitions and importance of intellectual property – Introduction and history of WTO –Structure of WTO agreements and dispute settlements – Principles of trading system –Trade policy reviews – Agreement on TRIPS – Ministerial conferences – Emerging issues in IPR–Protection of plant varieties–Patent sharks– Open-source movement –Bio-piracy.

UNIT–2: FUNDAMENTALS OF PATENT, TRANSFER AND INFRINGEMENT (9)

Fundamentals of Patent: History of patents in India– Grant of patent– Inventions those are not patentable – Process and product patent – Specification and procedure of patent – e-filling – Temporal and spatial – Opposition to grant of patent – Rights and PCT of patents – Marketing rights – Milestones in Indian patent. **Transfer and Infringement:** Transfer and Infringement of patent rights –Surrender of patents–Challenges in patents.

UNIT–3: COPYRIGHT AND TRADEMARKS (9)

Copyright: Definition – Copyright board registration in India – Ownership of copyright –Rights of the owner–Terms of copyright–Registration of copyright–Convention and UCC – Rights of broadcasting – International copyright – Infringement of copyright –Copyright Act, Amendment and Issues. **Trademarks:** Developing a Trademark–Trademark registration – Trademark applications – Procedure for trademark registration in India–Terms, assignment, transmission, certification, infringement of trademarks.

UNIT–4: GEOGRAPHICAL INDICATION, INDUSTRIAL DESIGN AND IC LAYOUT (9)

Geographical Indications: Concept, historical perspective, potential benefit, renewal and status of Geographical Indications–Geographical Indications in India– Infringement of GI – Status of GI registration in India. **Industrial Designs and IC Layouts:** Registration of Industrial Designs – Copyrights in Industrial designs – Terms, procedure and conditions for Industrial Designs– Infringement of ID –Integrated circuit layout design–Trade secrets.

UNIT–5: INTELLECTUAL PROPERTY MANAGEMENT (9)

Creating Intellectual Property: Need for creating intellectual property– Development of IP and Knowledge – Types of innovations – Behavioral aspects**. Intellectual Property Management:** Need and importance of IP management – IP management activities – 5Csmodelof managing IP – Research and Developments in India (Case Study).

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand fundamental aspects of intellectual property Rights.	**PO1,PO12**
CO2	Demonstrate knowledge on fundamentals of patent, transfer and infringement.	**PO1,PO3,PO12**
CO3	Understand fundamental aspects of copyrights and trademarks.	**PO1,PO3,PO12**
CO4	Demonstrate knowledge on geographical indication, industrial design and IC layout.	**PO1,PO3,PO12**
CO5	Demonstrate knowledge on intellectual property management.	**PO1,PO3,PO12**

TEXT BOOKS:

1. Intellectual Property Rights, Pandey Neeraj and Dharni Khushdeep, 2014, PHI Learning Ltd., India.
2. Intellectual Property Rights and Copyrights, S.P. Satarkar, EssEss Publications,2003.

REFERENCE BOOKS:

1. Intellectual Property in the New Technological Age, 2016: Vol. I Perspectives, Trade Secrets and Patents, Peter S. Menell, Mark A. Lemley, and Robert P.Merges.2016
2. Intellectual Property in the New Technological Age, 2016: Vol. II Copyrights, Trade marks and State IP Protections, Peter S.Menell, Mark A.Lemley, and Robert P.Merges.2016.
3. Intellectual Property Rights Law in India,T.Ramappa,2/e,2016,Asia Law House.
4. Resisting Intellectual Property, Debora J.Halbert,2006, Taylor & Francis Ltd ,2007
5. Law Relating to Intellectual Property Rights,VK Ahuja,3/e,2017,Lexis Nexis.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/cec22_lw12/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg98/preview

CO-PO MAPPING:

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

IV B.Tech - VII Semester

20HSM471C	MANAGING INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To the scope of innovation management principles.
2. To study the characteristics of innovation with infirm.
3. To study the technological entrepreneurship and innovation practices.
4. To study the concepts in entrepreneurship for engineers.
5. To understand the financial requirements for starting new venture.

UNIT–1: IMPORTANCE OF INNOVATION AND MANAGEMENT (9)

Importance of innovation–Innovation in an organizational context–Development activities and design environment–Innovation and invention–Successful and unsuccessful innovation – Types and models of innovation– DUI mode of innovation –Disruptive innovations–Cyclic model of innovation with inter connected cycles.

UNIT–2: MANAGING INNOVATION WITH INFIRMS (9)

Organizations and innovation – The dilemma of innovation management – Innovation dilem main low technology sectors–Dynamic capabilities–Managing uncertainty–Managing innovation projects – Organizational characteristics that facilitate the innovation process – Industrial firms – Organizational structures and innovation – The role of the individuals in innovation – IT systems and their impact on innovation – Management tools for innovation. **Operations and Process Innovation:** Design and innovation in the context of operations – Process design and innovation – Innovation in the management oftheoperationsprocess–Designoftheorganizationanditssuppliers– Lean innovation.

UNIT–3: TECHNOLOGICAL ENTREPRENEURSHIP AND INNOVATION PRACTICES (9)

Types of entrepreneurships – Sustainable entrepreneurship – Learning lifecycle and the learning strategy – Incubators – Technology management and transfer – Technology transfer mechanisms and models – Technology transfer obstacles – Success factors for technology transfer–Spinoffs– Strategically liances and commercialization metrics.

UNIT–4: ENTREPRENEURSHIP FOR ENGINEERS (9)

Industrial Evolution: Necessity of industrial viewpoints – Entrepreneurial mind. **How to Commercialize Invention:** Discovery of a new function or material – Performance improvement – Product planning creativity – Marketing creativity. **Start-Up:** The Founderandteam–Entrepreneurialprocess–Legalprocedure.**BusinessPlan:**Executive summary–Management and organization–Product/service–Marketingplan–Administrativepolicies, procedures, and controls – Growth plan –Financial plan.

UNIT–5: BUSINESS PLANT OF FUNDING VENTURE (9)

How to Find Financial Resources: Debt and equity — Internal and external funds including loans – Financial resources at the start-up stage – Government grants and Research funds – Private financing. **Financial Management:** Sales and payroll – Daily accounting–Financial statements – Demand, supply, and market equilibrium.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Describe the scope of importance in innovation and management	**PO1,PO6,PO8,PO9,PO11 ,PO12**
CO2	Understand the concepts of managing innovation with infirms.	**PO1,PO6,PO8,PO9,PO11 ,PO12**
CO3	Illustrate the concept of technological entrepreneurship and innovation practices	**PO1,PO6,PO8,PO9,PO11 ,PO12**
CO4	Summarize the systematic approach to entrepreneurship for engineers	**PO1,PO6,PO8,PO9,PO11 ,PO12**
CO5	Understand the business plan to funding venture.	**PO1,PO6,PO8,PO9,PO11 ,PO12**

TEXT BOOKS:

1. PaulTrott, Innovation Management and New Product Development ‖6/e, Pearson Education Ltd.,
2. Elias G.Carayannis, Elpida T.Samara &Yannis L. Bakouros—Innovation and Entrepreneurship - Theory, Policy and Practice Springer International PublishingSwitzerland,2015.
3. Kenji Uchino, Entrepreneurship for engineers‖ by Taylor and Francis Group, LLC,2010.

REFERENCE BOOKS:

1. RobertD. Hisrich, Michael P.Peters, Dean A.Entrepreneurship 10/e,Mc Graw-Hill, 2017.
2. Michael G.Luchs,K. Scott Swan and Abbie Griffin., Design Thinking-New Product Development Essentials from the PDMA,John Wiley & Sons, Inc.,2016.
3. Clayton M.Christensen and Clayton M.Christensen—The Innovator's Solution- Creating and Sustaining Successful Growth,Harvard Business School Press.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/127105007
2. https://nptel.ac.in/courses/109105176
3. https://nptel.ac.in/courses/107101086

CO-PO MAPPING:

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

IV B.Tech - VII Semester

20HSM472	UNIVERSAL HUMAN VALUES AND ETHICS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To develop a holistic perspective based on self-exploration about themselves (Human being), family, society and nature/existence
2. To understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
3. To Strengthening of self-reflection.
4. To d evelop of commitment and courage to act.
5. To study the holistic understanding of harmony on professional ethics.

UNIT –1: BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION (9)

Purpose and motivation for the course, recapitulation from Universal Human Values – Selfexploration–what is it? - its content and process; „natural acceptance" and experiential validation- as the process for self-exploration – continuous happiness and prosperity- a look at basic human aspirations – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility-the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
Activities: Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and coexistence) rather than as arbitrariness in choice based on liking-disliking

UNIT –2: UNDERSTANDING HARMONY IN THE HUMAN BEING (9)

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

UNIT –3: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY (9)

Understanding values in human-human relationship; meaning of justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; trust andrespect as the foundational values of relationship – Understanding the meaning of trust; difference between intention and competence – Understanding the meaning of respect, difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): resolution, prosperity, fearlessness (trust) and co-existence

as comprehensive human goals – Visualizing a universal harmonious order in society-undivided society, universal order-from family to world family.

Activities: Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students" lives.

UNIT –4: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE (9)

Understanding the harmony in the nature – Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature – Understanding existence as co-existence of mutually interacting units in all-pervasive space – Holistic perception of harmony at all levels of existence.

Activity: Include practice sessions to discuss human being as cause of imbalance in nature (film —Homell can be used), pollution, depletion of resources and role of technology.

UNIT –5: UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (9)

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order – Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b.At the level of society: as mutually enriching institutions and organizations – Sum up.

Activity: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Students are expected to become more aware of themselves,and their surroundings (family, society, nature)	**PO6, PO7, PO8,PO9, PO12CO2**
CO2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	**PO6, PO7, PO8, PO9, PO12**
CO3	They would have better critical ability.	**PO6, PO7, PO8, PO9, PO12**
CO4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	**PO6, PO7, PO8, PO9, PO12**
CO5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	**PO6, PO7, PO8, PO9, PO12**

TEXT BOOKS:

1. R R Gaur, R Asthana, G P Bagaria, -A Foundation Course in Human Values and Professional Ethics‖, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, -Teachers" Manual for A Foundation Course in Human Values and Professional Ethics‖, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034- 53-2

REFERENCE BOOKS:

1. A. N. Tripathi, –Human Values‖, New Age Intl. Publishers, New Delhi, 2004.
2. Mohandas Karamchand Gandhi -The Story of My Experiments with Truth‖
3. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak,1999.
4. Mohandas K. Gandhi, –Hind Swaraj or Indian Home Rule‖
5. Vivekananda - Romain Rolland(English)
6. Gandhi - Romain Rolland (English)

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/109104068
2. https://nptel.ac.in/courses/110105097
3. https://nptel.ac.in/courses/109106117
4. https://nptel.ac.in/courses/109103142

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 3)

20OHSM471	NANO SCIENCE AND TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE EDUCATIONAL OBJECTIVES:

1. To Understand the basic scientific concepts of Nano science, and various types of Nano materials.
2. To study various methods of synthesizing Nano materials
3. To identify different characterization techniques for Nano materials
4. To Understand the properties of Nano materials and the applications of Nano materials in various fields
5. To study various carbon Nano materials

UNIT-1: INTRODUCTIONTONANO SCIENCEANDTECHNOLOGY (9)
Definition of nano scale,-Significance of nano scale–Surface to volume ratio-Quantum confinement effect-Types of Nano materials: Zero, one and two dimensional nano materials with examples.

UNIT-2: PREPARATION OF NANO MATERIALS (9)
Top-Down and Bottom-Up approaches-Methods of preparation: Sol-gel method-Chemical vapour deposition-Plasmaarching-Ball milling-Electro-chemical deposition.

UNIT-3: STRUCTURE AND SURFACE CHARACTERIZATION OF NANO MATERIALS (9)
x- Ray diffraction-Ultra violet–Visible Spectroscopy–Fourier Transform Infrared Spectroscopy–Scanning Electron Microscopy–Transmission electron microscopy–Scanning Tunneling Microscope-Atomic force microscopy.

UNIT-4: PROPERTIES AND APPLICATIONS OF NANO MATERIALS (9)
Physical Properties - Chemical Properties - Mechanical properties -Electrical properties -Thermal properties - Magnetic properties - Optical Properties - Applications in Material science, Biology and Medicine, Surface science, Energy, Environment, Industry, Sports & Consumer products.

UNIT-5: CARBON NANO TUBES (9)
Allotropes of carbon **-** Graphene- Fullerences **-** Types of Carbon Nanotubes -Single walled carbon nanotubes- Multi walled carbon nanotubes- Fabrication of carbon nanotubes using Plasma Arching Method-Properties and Applications of Carbon nanotubes.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Acquire the basic knowledge on Nano science, and various types of Nano materials.	**PO1,PO12**
CO2	Identify appropriate method for the preparation of Nano materials	**PO1,PO12**
CO3	Develops skill to characterize Nano materials by various techniques	**PO1, PO4,PO12**
CO4	Analyze the different properties of Nano materials and identify their applications in various fields	**PO1,PO12**
CO5	Develop Knowledge on carbon Nanomaterials	**PO1,PO12**

TEXT BOOKS:

1. M.R.Srinivasan, New Age International,–Engineering Physics‖, Chennai 2011
2. K.Thyagarajan, –Engineering Physics‖,McGraw Hill Publishers,First Edition,New Delhi,2014.
3. Er. Rakesh Rathi,S.Chand,‖ Nano technology-Technology Revolution‖ of 21st Century Publications

REFERENCE BOOKS:

1. Nano technology-A Gentle Introduction to the Next Big Idea. Kindersely, India. Pvt., New Delhi, 2003, Dorling
2. Nano-The Essentials Understanding Nano Science and Nanotechnology, Tata McGraw-Hill Publication 2010,

REFERENCE WEBSITES:

1. https://onlinecourses.nptel.ac.in/noc19_mm21/preview
2. https://www.coursera.org/learn/nanotechnology#modules

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 3)

		L	T	P	C
20OCIV471	**DISASTER MANAGEMENT AND MITIGATION**	**3**	**0**	**0**	**3**

PRE-REQUISITES: A Course on Environmental Studies.

COURSE EDUCATIONAL OBJECTIVES:

1. To explain the disaster phenomenon and disaster preparedness.
2. To demonstrate the roles and responsibilities of different agencies.
3. To explain the disaster management techniques
4. To explain concept of disaster mitigation strategies
5. To demonstrate the different case studies on disaster management

UNIT-1: INTRODUCTION TO DISASTER PREPAREDNESS (9)

Disaster Management- Prevention-Preparedness and Mitigation-Disaster Preparedness-Concept& Nature-Disaster Preparedness Plan-Disaster Preparedness for People and Infrastructure Community based Disaster Preparedness Plan. Mitigation process-disaster management techniques, disaster management aspects.

UNIT-2: ROLES &RESPONSIBILITIES OF DIFFERENT AGENCIES (9)

Roll of Information-Education-Communication &Training-Role and Responsibilities of Central-State-District and local administration-Role and Responsibilities of Armed Forces-Police-Paramilitary Forces-Role and Responsibilities of International Agencies-NGOs-Community Based Org (CBOs), disaster management quality control.

UNIT-3: TECHNOLOGIES FOR DISASTER MANAGEMENT (9)

Role of IT in Disaster Preparedness-Remote Sensing-GIS and GPS-Use and Application of Emerging Technologies- Application of Modern Technologies for the Emergency Communication-Application and use of ICST for different disasters

UNIT-4: DISASTER MITIGATION (9)

Meaning and concept-Disaster Mitigation Strategies-Emerging Trends in Disaster Mitigation-Mitigation Management-Role of Team and Coordination

UNIT-5: DISASTER MANAGEMENT (9)

Applications and case studies and field works-Landslide Hazard Zonation-Case Studies-Earthquake Vulnerability Assessment of Buildings and Infrastructure-Case Studies-Drought Assessment-Case Studies-Coastal Flooding-Storm Surge Assessment-Floods-Fluvial and Pluvial Flooding-Case Studies-Forest Fire-Case Studies-Man Made Disasters-Case Studies-Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Explain the disaster phenomenon and disaster preparedness	**PO1**
CO2	Demonstrate the roles and responsibilities of different agencies	**PO6**
CO3	Analyse the techniques for disaster management	**PO2**
CO4	Demonstrate the disaster mitigation strategies	**PO6,PO7**
CO5	Apply the knowledge gained to manage the disasters.	**PO1,PO12**

TEXT BOOKS:

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press,U.K.
2. Roy, P.S -Space Technology for Disaster management A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing(NRSA) Dehradun,.(2000)

REFERENCE BOOKS:

1. Singh B.K., 2008, –Handbook of Disaster Management, Techniques& Guidelines, Rajat Publication.
2. Ghosh G.K., 2006, –Disaster Management, APH Publishing Corporation
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California,EMSAno.214, June2003
4. Inter Agency Standing Committee (IASC)(Feb.2007).IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/105/104/105104183/
2. https://www.coursera.org/learn/ai-and-disaster-management#modules

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 3)

20OEEE471	PLC AND APPLICATIONS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Gain the Knowledge of various skills necessary for Industrial applications of Programmable logic controller (PLC).
2. Understand the basic programming concepts and various logical Instructions used in Programmable logic controller (PLC).
3. Gain the Knowledge on PLC Timers and Counters.
4. Solve the problems related to I/O module, Data Acquisition System and Communication Networks using Standard Devices.
5. Provide knowledge on DLC and its applications.

UNIT-1: INPUT AND OUTPUT MODULES (9)

PLC Basics: PLC system - I/O modules and interfacing - CPU processor – programming Equipment- programming formats - construction of PLC ladder diagrams –Devices connected to I/O modules. PLC Programming: Input instructions - outputs – operational procedures- programming examples using contacts and coils Drill press operation.

UNIT-2: DESIGN AND PROGRAMMING (9)

Digital logic gates - programming in the Boolean algebra system - conversion examples. Ladder Diagrams for process control: Ladder diagrams & sequence listings – ladder diagram construction and flowchart for spray process system.

UNIT-3: PLC REGISTERS (9)

PLC Registers: Characteristics of Registers -module addressing -holding registers –Input Registers- Output Registers. PLC Functions: Timer functions & Industrial applications –counter function & industrial applications -Arithmetic functions -Number comparison functions –number conversion functions

UNIT-4: PLC APPLICATIONS (9)

Data handling functions: SKIP-Master control Relay-Jump-Move-FIFO-FAL-ONS -CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register - sequence functions and applications - controlling of two-axis & three axis Robots with PLC-Matrix functions.

UNIT-5: DCS AND ITS APPLICATIONS (9)

Distributed Control System (DCS) – Evolution – Different Architectures – Logical Control Unit – Operator Interface – Display – Engineering Interface. DCS Applications to Power Plant–Iron and Steel Plants–Chemical Industries–Paper and Pulp Industries.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Have knowledge of Programmable Logic Controller domain on various Logical Operation and Various Advanced Logical Instruction, I/O Module, Sensor, Actuator, Communication and Measurement System.	**PO1,PO2**
CO2	Understand the basic programming concepts and various logical Instructions used in Programmable logic controller (PLC).	**PO1,PO2,PO3**
CO3	Understand the operation of Timers and Counters in Programmable logic controller (PLC).	**PO1,PO2,PO3**
CO4	Compute the extent and nature of electronic circuitry in Programmable logic controller(PLC) and SCADA including monitoring and control circuits for Communication and Interfacing.	**PO1,PO2,PO3**
CO5	Provide knowledge on DLC and its applications	**PO1,PO2,PO3**

TEXT BOOKS:

1. W. Bolton -Programmable Logic Controllers‖ - 5th Edition- Elsevier -2010
2. John W. Webb & Ronald A. Reiss -Programmable Logic Controllers- Principles and Applications‖ -Fifth Edition- PHI

REFERENCE BOOKS:

1. Programmable Logic Controllers- Programming Method and Applications –JR.Hackworth& F.D Hack worthJr.– Pearson- 2004.
2. Distributed Computer Control of Industrial Automation by Popovic Dand Bhatkar V.P -Marcel Dekkar Inc.-1990.
3. Distributed Control Systems by Michal P.Lucas-Vannstrand –Reinhold Co. -1986.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/117/106/117106086/

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 3)

20OMEC471	PRODUCT DESIGN AND INNOVATION	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To develop the Characteristics of successful product design and development in an organization
2. To evaluate the product planning and product specification of a product
3. To understand the generation, selection and testing of a concept in the product design.
4. To develop product architecture and design for manufacturing new product
5. To understand the prototypes and principles.

UNIT–1: INTRODUCTION TO PRODUCT DESIGN AND INNOVATION (9)
Characteristics and challenges of successful product development – Product development concept – Generic product development– Process flow and organization structure – Opportunity identification and process – Establish a charter – Generate many opportunities – Screening and develop of promising opportunities–Select exceptional opportunities.

UNIT–2: PRODUCT PLANNING AND PRODUCT SPECIFICATION (9)
Product planning process – Identification of opportunities – Evaluation and prioritization of projects- Allocation of resources and timing – Pre-project planning – Identification of customer needs – Collection and Interpretation of raw data from customers – Organization of the needs– Establishment of relative importance of needs–Product specifications–Target specifications–Setting-up of final specifications.

UNIT–3: CONCEPT GENERATION, SELECTION, TESTING (9)
Concept generation – Clarification of the problem – Searching externally and internally –Systematic exploration–Concept selection–Concept screening and concept scoring–Concept testing–Survey population and format–Measuring the customer response.

UNIT–4: RODUCT ARCHITECTURE AND DESIGN FOR MANUFACTURE (9)
Product architecture, modularity and implications–Delayed differentiation–Plat form planning– System-level–Quality of industrial design–Design for environment process–Potential environmental impacts–DFE guidelines to the product design–Assessing and elimination of environmental impacts- Design for manufacturing– Estimation of manufacturing costs–Reduction of costs of components, assembly, supporting production –Impact decisions of DFM.

UNIT–5: PRODUCT DEVELOPMENTECONOMICS ANDMANAGINGPROJECTS (9)
Planning of prototypes – Robust design process –Identify the performance metrics, and noise factors – Objective function and experimental plan – Run the experiment – Repeat and confirm factor – Overview, formulation, strategy and utility of patents– Prior inventions–Refine claims – Product development economics and analysis – Financial model – Use of sensitivity analysis – Project success – Managing projects – Baseline project planning –Project execution.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Describe the Characteristics of successful product development in an organization	**PO1,PO2,PO3**
CO2	Evaluate the product planning and product specification of a product	**PO1,PO2, PO3**
CO3	Understand the generation, selection and testing of a product concept	**PO1,PO2,PO3**
CO4	Develop product architecture and design for manufacturing new product	**PO1,PO2,PO3**
CO5	Understand the principles of prototypes, economics and project management	**PO1,PO2,PO3,PO11**

TEXT BOOKS:

1. UlrichK.T.and EppingerS.D.,–Product Design and Development‖, McGraw-Hill Education, 6/e, 2015.
2. Kevin Otto and Kristin Wood, -Product Design: Techniques in Reverse Engineering and New Product Development‖, Pearson Education, 1/e, 2003.

REFERENCE BOOKS:

1. PaulTrott,–Innovation Management and New Product Development‖, Pearson Education, 6/e, 2016.
2. Chitale.A. Kand Gupta.R.C, -Product Design and Manufacturing‖, Prentice Hall of India, New Delhi, 2011.
3. Mukesh Chaturvedi, Aseem Kumar and Rahul Manmohan,—Managing Innovations and New Product Development: Concepts and Cases‖, PHI Learning,2009.
4. James M. Morganand JeffreyK.Liker,–Designing the Future‖,McGraw-Hill Education,1/e,2019.
5. James M. Morganand JeffreyK.Liker,–Designing the Future‖,McGraw-Hill Education,1/e,2019.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/112/107/112107217/
2. https://nptel.ac.in/courses/112/104/112104230/

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 3)

20OECE471	MEDICAL ELECTRONICS	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To gain knowledge and analyze the various physiological parameters and its recording methods, signal characteristics.
2. To understand the respiratory, Blood pressure, temperature measurements etc.
3. To study about the various assist devices used in the hospitals.
4. To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and the rapeutic techniques.
5. To know the recent trends in Tele-medicine and laser in medicine.

UNIT–1: ELECTRO-PHYSIOLOGYANDBIO-POTENTIALRECORDING (9)
The origin of Bio-potentials; bio potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical wave forms and signal characteristics.

UNIT–2:BIO-CHEMICALANDNONELECTRICALPARAMETERMEASUREMENT (9)
pH, PO2, PCO2, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratorymeasurement,Bloodpressure,temperature,pulse,Bloodcellcounters.

UNIT–3:ASSIST DEVICES (9)
Cardiac pacemakers, DC Defibrillator ,Dialyzer ,Heart lung machine

UNIT–4:PHYSICAL MEDICINE AND BIO TELEMETRY (9)
Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety

UNIT–5:RECENT TRENDS IN MEDICAL INSTRUMENTATION (9)
Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction toTele-medicine.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Distinguish and analyze the various physiological parameters and its Recording methods, signal characteristics.	**PO1,PO2**
CO2	Describe the respiratory, Blood pressure, temperature measurements etc.	**PO1,PO2**
CO3	Analyze function of various assist devices used in the hospitals.	**PO1,PO2**
CO4	Demonstrate knowledge about equipment used for physical. Medicine and the various recently developed diagnostic and therapeutic techniques.	**PO1,PO2**
CO5	Extend knowledge on recent trends in telemedicine and laser in medicine.	**PO1,PO2**

TEXT BOOKS:

1. Leslie Cromwell,–Biomedical Instrumentation and Measurement‖, Prentice Hall of India, NewDelhi, 2007.
2. John G.Webster, –Medical Instrumentation Application and Design‖ Wiley India 3rd, Edition, 2007.

REFERENCE BOOKS:

1. Khandpur,R.S,–Handbook of Biomedical Instrumentation‖ TATA Mc Graw -Hill, New Delhi, 2003.
2. Joseph J. Carrand John M.Brown, ‖Introduction to Biomedical equipment Technology‖, John Wiley and Sons, New York, 2004.

REFERENCE WEBSITE:

1. https://onlinecourses.nptel.ac.in/noc21_ee105

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 4)

20OHSM472	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

UNIT–1: INTRODUCTION ON TOTAL QUALITY MANAGEMENT (9)

Introduction–Need for quality–Evolution of quality–Definition of quality–Dimensions of manufacturing and service quality – Basic concepts of TQM – Definition of TQM – TQM framework– Contributions of Deming, Juran and Crosby–Barriers to TQM.

UNIT–2:TQM PRINCIPLES (9)

Leadership – Strategic quality planning – Quality statements – Customer focus, customer orientation, customer satisfaction, customer complaints and retention–Employee involvement – Motivation – Empowerment – Teams and teamwork – Recognition and reward – Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen–Supplier partnership, partnering, supplier selection and supplier rating.

UNIT–3: QUALITY CONTROL (9)

Control chart for attributes – Control chart for non-conforming – p chart and np chart –Control chart for nonconformities: C and U charts – Control chart for variables: X chart, R chart and σ chart – State of control and process out of control identification in charts, pattern study and process capability studies.

UNIT–4: TQM TOOLS AND TECHNIQUES (9)

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector – Bench marking – Benchmarking process – FMEA – Stages – Types – Quality circles – Quality function development(QFD)–Taguchi quality loss function–TPM–Reliability fundamentals and concepts.

UNIT–5: QUALITY SYSTEMS AND STANDARDS (9)

Need for ISO 9000 – ISO 9001-2008 Quality System – Benefits of ISO registration – ISO9000 standards–AS9100,TS16949 and TL9000–ISO9001Requirements–Implementation – Documentation-Internal and external audits – Registration – TQM implementation in manufacturing and service sectors. **Environmental Management System:** ISO14000 Series Standards–Concepts and Requirements of ISO 14001.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Describe the concepts of total quality management, and Contributions of TQM	**PO1,PO11,PO12**
CO2	Understand the TQM principles and impactof5s, Kaizen, PDS A cycles in continuous process improvement.	**PO1,PO11,PO12**
CO3	Illustrate the basic need of quality control and process control in an organization	**PO1,PO2,PO11,PO12**
CO4	Summarize the traditional and modern TQM tools and techniques	**PO1,PO3,PO11,PO12**
CO5	Realizethequalitystandard,requirementsandelementsinQualitym anagement system	**PO1,PO11,PO12**

TEXT BOOKS:

1. Bester field Dale H, Bester field Carol, Bester field Glen H, Bester field Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi,–Total Quality Management‖,Pearson Education,5/e,2018,NewDelhi.
2. Douglas.C. Montgomery, John Wiley, -Introduction to Statistical Quality Control‖,7/e,2013,.

REFERENCE BOOKS:

1. D.R.Kiran, Butterworth-Heinemann,‖ Total Quality Management‖,1/e,2016,.
2. Poornima M. Charantimath, -Total Quality Management‖, Pearson Education, New Delhi, 3/e,2017,
3. TapanK.Bose,‖ Total Quality of Management‖,Pearson EducationIndia2010,.
4. Bedi Kanishka,—Quality Management‖,Oxford UniversityP ress,India 2006,.
5. Ramasamy Subbura,–Total Quality Management‖,McGrawHillEducation2011,

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/110/104/110104085/
2. https://nptel.ac.in/courses/110/104/110104080/
3. https://nptel.ac.in/courses/112/107/112107259/
4. https://nptel.ac.in/courses/110/101/110101150/

CODES/TABLES:

1. Use of approved statistical table permitted in the examination.

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 4)

20OCIV472	**INDUSTRIAL WASTE TREATMENT AND DISPOSAL**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: A Course on Environmental Engineering

COURSE EDUCATIONAL OBJECTIVES:

1. To make the students understand about industrial waste characteristics and effects on sewer land and streams.
2. To provide knowledge about waste management approach through cleaner production
3. To make the students understand about pollution from major industries
4. To gain knowledge about various treatment technologies regarding industrial waste water.
5. To provide knowledge about hazard ous waste management and disposal

UNIT-1: INTRODUCTION **(9)**

Types of industries and industrial pollution–Characteristics of industrial wastes–Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNI-2: CLEANER PRODUCTION **(9)**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications–Recycle, reuse and by product recovery–Applications.

UNIT-3: POLLUTION FROM MAJOR INDUSTRIES **(9)**

Sources, Characteristics, waste treatment flow sheets for selected industries suchasTextiles,Tanneries,Pharmaceuticals,Electroplatingindustries,Dairy,Sugar,Paper,distilleries,Steel plants,Refineries,fertiliser,thermalpowerplants–Wastewaterreclamationconcepts

UNIT-4: TREATMENTTECHNOLOGIES **(9)**

Equalisation–Neutralisation–Removal of suspended and dissolved organic solids-Chemical oxidation–Adsorption-Removal of dissolved in organics–Combined treatment of industrial and municipalwastes –Residue management–Dewatering -Disposal

UNIT-5: HAZARDOUSWASTEMANAGEMENT **(9)**

Hazardous wastes - Physico chemical treatment – solidification – incineration – Securedl and fills

Total Hours:45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Understand the nature and characteristics of industrial waste water	**PO1,PO2**
CO2	Understand the waste management approach adopting cleaner production technology	**PO1,PO2**
CO3	Analyse the pollution from major industries	**PO1,PO2, PO3**
CO4	Understand the various treatment technologies regarding industrial waste water	**PO3,PO6**
CO5	Understand the hazardous waste management and disposal	**PO1,PO2, PO3**

TEXT BOOKS:

1. M.N.Rao&A.K.Dutta,–Waste water Treatment‖,Oxford-IBH Publication,1999.
2. W .W. Eckenfelder Jr., -Industrial Water Pollution Control‖, McGraw-Hill Book Company, NewDelhi, 2000.

REFERENCE BOOKS:

1. T.T.Shen,–Industrial Pollution Prevention‖,Springer,1999.
2. R.L.Stephenson and J.B.Blackburn, Jr., -Industrial Wastewater Systems Handbook‖, Lewis Publisher, New Yark, 1998

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/105/106/105106056/https://nptel.ac.in/courses/105/105/105105169/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	2	-	-	-	-	-	-
CO5	1	2	3	-	-	-	-	-	-	-	-	-
CO*	**1.66**	**2.25**	**2.66**	-	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech - VII Semester
(OPEN ELECTIVE - 4)

		L	T	P	C
20OEEE472	**ELECTRIC VEHICLE TECHNOLOGY**	**3**	**0**	**0**	**3**

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Understand Electric and Hybrid ElectricVehicles
2. Study and analyze the Energy Storage for EV and HEV
3. Study and understand the concept of Electric Propulsion
4. Analyze and design the Electric and Hybrid ElectricVehicles
5. Study operation of Power Electronic Converter for Battery Charging.

UNIT-1: ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement,Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains.

UNIT-2: ENERGY STORAGE FOREVANDHEV (9)

Energy storage requirements, Battery parameters ,Types of Batteries, Modeling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Super Capacitors.

UNIT-3: ELECTRIC PROPULSION (9)

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives.

UNIT-4: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of major components, power rating of traction motor, power rating of engine/generator, and design of PPS. Parallel Hybrid Electric Drive Train Design: Control strategies of parallel hybrid drive train, design of engine power capacity, design of electric motor drive capacity, transmission design, and energy storage design.

UNIT-5: POWER ELECTRONIC CONVERTER FOR BATTERY CHARGING (9)

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z-converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understand Electric and Hybrid Electric Vehicles	**PO1,PO2,PO3**
CO2	Study and analyze the Energy Storage for EV and HEV	**PO1,PO2,PO3**
CO3	Study and understand the concept of Electric Propulsion	**PO1,PO2,PO3**
CO4	Analyze and design the Electric and Hybrid Electric Vehicles	**PO1,PO2,PO3**
CO5	Study operation of Power Electronic Converter for Battery Charging.	**PO1,PO2,PO3**

TEXT BOOKS:

1. M.Ehsani, Y.Gao,S.Gayand Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles‖ Fundamentals, Theory and Design‖,CRC Press,2005
2. Iqbal Husain,Electric and Hybrid Vehicles‖ Design Fundamentals‖,CRCPress,2003.

REFERENCE BOOKS:

1. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles, Springer, 2013.
2. C.C.ChanandK.T.Chau,ModernElectricVehicleTechnology,OXFORDUniversityPress,2001.ChrisMi, M.Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications WithPractical Perspectives, WileyPublication,2011.

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 4)

20OMEC472	SOLAR ENERGY TECHNOLOGY	L	T	P	C
		3	0	0	3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Describing the solar radiation and various solar collectors.
2. Explaining the various solar thermal energy technologies and their applications.
3. Analyzing the various solar PV cell materials and conversion techniques.
4. Discussing various solar SPV systems designs and their applications.
5. Applying solar passive building techniques for cooling and heating applications.

UNIT–1: SOLAR RADIATION ANDCOLLECTORS (9)

Introduction to the sources of energy – Solar angles – Sun path diagrams– Radiation–extraterrestrial characteristics - measurement and estimation on horizontal and tilted surfaces – flat plate collector thermal analysis - testing methods- evacuated tubular collectors-concentratorcollectors–classification-designandperformanceparameters-trackingsystems-compoundparabolic concentrators - parabolic trough concentrators - concentrators with point focus -Heliostats–performance of the collectors.

UNIT–2: SOLAR THERMAL TECHNOLOGIES (9)

Principle of working, types, design and operation of - Solar heating and cooling systems –Thermal Energy storage systems–Solar Desalination–Solar cooker: domestic, community–Solar pond–Solar drying– solar chimney-solar thermal electricity conversion.

UNIT–3: SOLAR PV FUNDAMENTALS (9)

Semi conductor – properties - energy levels - basic equations of semiconductor devices physics. Solar cells - p-n junction: homo and hetero junctions - metal-semiconductor interface - dark and illumination characteristics - figure of merits of solar cell– efficiency limits - variation of efficiency with band-gap and temperature - efficiency measurements –high efficiency cells –Solar thermo-photo voltaics.

UNIT–4: SPV SYSTEM DESIGN AND APPLICATIONS (9)

Solar cell array system analysis and performance prediction- Shadow analysis: reliability –solar cell array design concepts - PV system design - design process and optimization -detailed array design-storage autonomy-voltage regulation-maximum tracking–centralized and decentralized SPV systems-standalone-hybrid and grid connected system - System installation -operation and maintenances - field experience - PV market analysis and economics of SPV systems.

UNIT–5: SOLARPASSIVEARCHITECTURE (9)

Thermal comfort - bioclimatic classification – passive heating concepts: direct heat gain - indirectheatgain-isolatedgainandsunspaces-passivecoolingconcepts:evaporativecooling-Radiative cooling- application of wind, water and earth for cooling; shading -paints and cavity walls for cooling– roof radiation traps - earth air-tunnel– energy efficient landscape design-thermal comfort.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Describe the solar radiation and various solar collectors.	**PO1,PO2,PO3**
CO2	Explain the various solar thermal energy technologies and their applications.	**PO1,PO2,PO3**
CO3	Analyze the various solar PV cell materials and conversion techniques.	**PO1,PO2,PO3**
CO4	Discuss various Solar SPV systems designs and their applications.	**PO1,PO2,PO3**
CO5	Apply solar passive building techniques for cooling and heating applications.	**PO1,PO2,PO3**

TEXT BOOKS:

1. G.D.Rai,–Non-Conventional Energy Sources‖,Khanna Publishers, New Delhi, 2014.
2. Twidell, J.W. & Weir. A.,—Renewable Energy Resources‖ ,EFNSpon Ltd., UK, 2015.

REFERENCE BOOKS:

1. Chetan Singh Solanki,–Solar Photo voltatics–Fundamentals, Technologies and Applications‖, PHI Learning Private limited, 2011.
2. JohnA.Duffie,William A.Beckman,–Solar Engineering of Thermal Processes‖,John Wiley& Sons, 2013.
3. Lovegrove K.,SteinW.,–Concentrating Solar Power Technology‖, Woodhead Publishing Seriesin Energy, Elsevier, 1/e,2012.
4. –Solar Energy International, Photovoltaic–Design and Installation Manual‖, New Society Publishers, 2006.
5. Sukhatme SP, Nayak JK,–Solar Energy–Principle of Thermal Storage and collection‖, Tata Mc Graw Hill, 2008.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/112/104/112104300/
2. https://nptel.ac.in/courses/115/103/115103123/

CO-PO MAPPING:

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

IV B.Tech - VII Semester
(OPEN ELECTIVE - 4)

20OECE472	PATTERN RECOGNITION	L	T	P	C
		3	0	0	3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on Basics Pattern Recognition.
2. To acquire knowledge on various methods of statistical Pattern Recognition.
3. To be able to solve dimensionality problem.
4. To understand the linear discriminant functions and neural network classifier.
5. To gain the principle of time varying pattern recognition and unsupervised classification.

UNIT–1: INTRODUCTION TO PATTERN RECOGNITION (9)

Linear Discriminant, Multiple Discriminant Analysis, Feature extraction and Pattern Representation Concept of Supervised and Unsupervised classification Introduction to Application Areas.

UNIT–2: STATISTICAL PATTERN RECOGNITION (9)

Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary Normal Density, Discriminant Function, Discrete Features, Parameter estimation.

UNIT–3: DIMENSIONALITY PROBLEM (9)

Dimension and accuracy, Computational Complexity, Dimensionality Reduction, Fisher Density Estimation, Nearest Neighbor Rule, Fuzzy Classification.

UNIT–4: LINEAR DISCRIMINANT FUNCTIONS (9)

Separability, Two Category and Multi Category Classification, Linear Discriminators, Perceptron Criterion, Relaxation Procedure, Minimum Square Error Criterion, Widrow- Hoff Procedure, Ho-Kashyap Procedure, Kesler"s Construction.

Neural Network Classifier:

Single and Multilayer Perceptron, Back Propagation Learning, Hopfield Network, Fuzzy Neural Network

UNIT–5: TIME VARYING PATTERN RECOGNITION (9)

First Order Hidden Markov Model, Evaluation, Decoding, Learning.

Unsupervised Classification:

Clustering, Hierarchical Clustering, Graph Based Method, Sum of Squared Error Technique Iterative Optimization.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	DemonstrateknowledgeonBasicsofpatternrecognitionandanalysisof unsupervisedclassificationwithapplicationareas.	**PO1,PO2**
CO2	Demonstrate the knowledge on statistical pattern recognition with analytical skills.	**PO1,PO2,PO4**
CO3	Ability to understand the dimensionality problem	**PO1,PO2,PO4**
CO4	Acquire the basic knowledge on linear discriminant function and neural network classifier.	**PO1,PO2**
CO5	Understand the need for and use of time varying pattern recognition and unsupervised classification	**PO1,PO2,PO4**

TEXT BOOKS:

1. Robert J. Schalkoff, –Pattern Recognition Statistical, Structural and Neural Approaches‖,John Wiley & Sons Inc., NewYork, 1992.
2. Tou and Gonzales,-Pattern Recognition Principles‖, Wesley Publication Company, London, 1974.

REFERENCE BOOKS:

1. Duda R.O and Har P.E., –Pattern Classification and Scene Analysis‖,Wiley, NewYork,1973.
2. Morton Nadier and Eric Smith P,–Pattern Recognition Engineering‖, John Wiley& Sons, New York,1993.

REFERENCE WEBSITES:

1. https://en.wikipedia.org/wiki/Pattern_recognition
2. https://www.journals.elsevier.com/pattern-recognition
3. https://www.sciencedirect.com/journal/pattern-recognition

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	1	-	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**-**	**1.67**	-	-	-	-	-	-	-	-

IV B.Tech - VIII Semester

20CAI481	PROJECT WORK	L	T	P	C
		0	0	0	12

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Discovering potential research areas in the field of Computer science and Engineering.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design / fabrication / analysis for a specific application, a research project with a focus on an application needed by the industry / society, a computer project, or a design and analysis project. A project topic must be selected by the students in consultation with their guides.

To train the students in preparing project reports and to face reviews and viva voce examination. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate in-depth knowledge on the selected topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for selected work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen selected problem.	**PO3**
CO4	Under take investigation of selected problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for selected work	**PO5**
CO6	Apply selected information for sustain able development tof the society.	**PO6**
CO7	Understand the impact of selected concept in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the selected work.	**PO8**
CO9	Function effectively as individual and a member in the internship.	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting internship report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the internship.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the selected topic.	**PO12**

CO-POMAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	3	-	-	-	-	-	-
CO7	-	-	-	-	-	-	3	-	-	-	-	-
CO8	-	-	-	-	-	-	-	3	-	-	-	-
CO9	-	-	-	-	-	-	-	-	3	-	-	-
CO10	-	-	-	-	-	-	-	-	-	3	-	-
CO11	-	-	-	-	-	-	-	-	-	-	3	-
CO12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

SUMMARY OF CREDIT ALLOCATION

S.NO	Subject Area	Credits As Per Semester								Total Credits	Percentage – wise Credit Distribution
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	4.5	-	-	3	2	-	6	-	15.5	9.50
2.	BSC	3	11	3	4	-	-	-	-	21	12.88
3.	ESC	4.5	8.5	4.5	-	-	-	-	-	17.5	6.687
4.	PCC	7.5	-	12	13.5	12	12	-	-	57	34.96
5.	SOC/SAC	-	-	2	2	-	2	2	-	8	4.90
6.	PEC	-	-	-	-	3	3	9	-	15	9.20
7.	OEC	-	-	-	-	3	3	6	-	12	7.36
8	PROJ	-	-	-	-	1.5	1.5	2	12	17	10.42
9	MAC	-	-	-	Non-credit	Non-credit	Non-credit	-	-	-	-
Total		**19.5**	**19.5**	**21.5**	**22.5**	**21.5**	**21.5**	**25**	**12**	**163**	163

Note: ***HSMC - Humanities and Social Science including Management Courses; BSC - Basic Science Courses; ESC - Engineering Science Courses; PCC - Professional Core Courses; PEC - Professional Elective Courses; OEC - Open Elective Courses; SOC/SAC - Skill Oriented Courses / Skill Advanced Courses; PROJ - Internship, Seminar and Project Work; MAC - Mandatory Audit Courses; MNRC/HNRC - Minor Courses / Honor Courses***