COURSE STRUCTURE AND DETAILED SYLLABI FOR
FOUR YEARS B. TECH
UNDER ACADEMIC REGULATIONS R20
FOR

B. Tech Regular (Full-Time) Four Year Degree Courses
(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)
(For the Batches Admitted From 2021-2022)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
With Specialization in
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Accredited by NBA, New Delhi & NAAC with A Grade, Bengaluru

Affiliated to JNTUA, Ananthapuramu, Recognized by the UGC under

Section 12(B) and 12(F) | Approved by AICTE, New Delhi.

R.V.S. Nagar, TIRUPATI ROAD, CHITTOOR- 517 127(A.P)-INDIA

Website: www.svcetedu.org E-mail: hodcsm@svcetedu.org

FOREWORD

The autonomy conferred Sri Venkateswara College Engineering and technology by JNT University, Ananthapuramu based on performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms the monitoring bodies UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Sri Venkateswara College of Engineering and Technology is proud to win the confidence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, the standards and ethics it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education.

As a follow up, statutory bodies like Academic Council and

Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTUA, Ananthapuramu to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, to produce quality engineering graduates to the society.

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

Principal

Vision and Mission of the Institute

Vision

- Carving the youth as dynamic, competent, valued and knowledgeable professionals who shall lead the Nation to a better future.

Mission

- Providing quality education, student-centered teaching-learning processes and state-of-art infrastructure for professional aspirants hailing from both rural and urban areas.
- Imparting technical and management education to encourage independent thinking, develop strong domain of knowledge, own contemporary skills and positive attitudes towards holistic growth of young minds.
- Evolving Institution into a Center of Excellence and Research.

Quality policies

Sri Venkateswara College of Engineering and Technology strides towards excellence by adopting a system of quality policies and processes with continued improvements to enhance student’s skills and talent for their exemplary contribution to the society, the nation and the word.

Vision and Mission of the Department under R20 Regulations

VISION

- To achieve excellent standard of quality education by using latest tools in Artificial Intelligence and disseminating innovations to relevant areas.

MISSION

- To develop professionals who are skilled in Artificial Intelligence and Machine Learning.
- Impart rigorous training to generate knowledge through the state-of-the-art concepts and technologies in Artificial Intelligence and Machine Learning.
- Establish centers of excellence in leading areas of computing and artificial intelligence to inculcate strong ethical values, innovative research capabilities and leadership abilities in the young minds to work with a commitment to the progress of the nation.

Program Educational Objectives (PEOs):

PEO1: To be able to solve wide range of computing related problems to cater to the needs of industry and society.

PEO2: Enable students to build intelligent machines and applications with a cutting-edge combination of machine learning, analytics and visualization.

PEO3: Produce graduates having professional competence through life-long learning such as advanced degrees, professional skills and other professional activities related globally to engineering & society.

Program Specific Outcomes (PSOs):

PSO1: Should have an ability to apply technical knowledge and usage of modern hardware and software tools related AI and ML for solving real world problems.

PSO2: Should have the capability to develop many successful applications based on machine learning methods, AI methods in different fields, including neural networks, signal processing, and data mining

ACADEMIC REGULATIONS-R20
COURSE STRUCTURE AND DETAILED SYLLABI

B. TECH REGULAR (FULL-TIME) FOUR YEAR DEGREE PROGRAMME
(FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-21)

BACHELOR OF TECHNOLOGY
FOR

B. Tech Regular (Full-Time) Four Year Degree Courses

(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2021-2022)

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SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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(**Affiliated to J.N.T. University Anantapur, Ananthapuramu).**

ACADEMIC REGULATIONS (R20) for

B.Tech Regular (Full - Time) Four Year Degree Program

(For the batches admitted from the academic year 2020-21)

and

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2021-22)

1. Applicability : All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2020-2021 onwards. Any reference to "College" in these rules and regulations stands for Sri Venkateswara College of Engineering and Technology (Autonomous).

2. Extent : All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, Principal, Sri Venkateswara College of Engineering and Technology (A) shall be the Chairman of the Academic Council.

3. Admission :

3.1 Admission into first year of Four Year B.Tech., Degree Program of study in Engineering:

3.1.1 Eligibility: A candidate seeking admission into the first year of four year B.Tech., Degree Program should have Passed either Intermediate Public Examination conducted by the Board of Intermediate Education, Government of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination recognized by the Board of Intermediate Education and JNTUA, Ananthapuramu) or Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by State Board of Technical Education, Government of Andhra Pradesh and JNTUA, Ananthapuramu) for admission.

3.1.2 Admission Procedure:

As per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B.Tech., Degree Program as follows:

Seats under various categories are filled as per the norms prescribed by the Government of Andhra Pradesh.

3.2 Admission into the second year of four- Y e a r B.Tech., Degree Program(Lateral Entry Scheme) in Engineering:

3.2.1 Eligibility: Candidates qualified in ECET (FDH) and / or admitted by the Convener, ECET (FDH). In all such cases for admission, when needed, Permissions from the statutory bodies are to be obtained.

3.2.2 Admission Procedure: Lateral Entry seats are filled as per the norms prescribed by the Government of Andhra Pradesh from time to time.

4. Programs of study offered leading to the award of B. Tech degree:

1. B.Tech (Civil Engineering)
2. B.Tech (Electrical and Electronics Engineering)
3. B.Tech (Mechanical Engineering)
4. B.Tech (Electronics and Communication Engineering)
5. B.Tech (Computer Science and Engineering)
6. B.Tech (Information Technology)
7. B.Tech (Computer Science and Engineering (Artificial Intelligence and Machine Learning))
8. B.Tech (Computer Science and Engineering (Data Science))

5. Choice Based Credit System:

The Indian Higher Education Institutions (HEI’s) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit-based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice-based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of Lectures / Tutorials / Laboratory Work / Field Work / Project Work / MOOCS / Internship / Comprehensive Examination / Seminars / Presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

1. Choose electives from a wide range of elective courses offered by the departments.
2. Undergo additional courses of interest.
3. Adopt an interdisciplinary approach in learning.
4. Make the best use of expertise of the available faculty.

6. Medium of instruction:

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

7. Types of Courses:

Courses in a programme may be of five kinds: **Foundation, Skill, Core, Elective and Mandatory.**

7.1 Foundation / Skill Course:

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamental to learn any subject.

7.2 Core Course:

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

7.3 Elective Course:

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline / domain
- Nurturing student's proficiency / skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an interdisciplinary area called as "Open Elective".

There are five professional elective groups. Students can choose not more than one elective from each of the five groups. Also there are four open elective groups, students can choose not more than one elective from each of the four groups.

8. Academic Year:

8.1 Course Duration:

8.1.1 Course duration for B. Tech program of study is 4 years and the maximum duration to complete the program is 8 years excluding the gap year.

8.1.2 For lateral entry students the course duration is 3 years and the maximum duration to complete the program is 6 years excluding the gap year.

8.2 Each academic year is divided into two semesters and each semester shall have a minimum of 16 Instructional Weeks.

9. Unique course identification code:

Every course of the B. Tech program will be placed in one of the eleven groups of courses as listed in the table 1. The various courses and their two-letter codes are given below.

Table 1: Group of Courses

S.No.	Branch	Code
1	Civil Engineering	CE
2	Electrical and Electronics Engineering	EE
3	Mechanical Engineering	ME
4	Electronics and Communication Engineering	EC
5	Computer Science and Engineering	CS
6	Information Technology	IT
7	Computer Science and Engineering(Artificial Intelligence and Machine Learning)	CM

8	Computer Science and Engineering(Data Science)	CD
9	Humanities and Basic Sciences	HS
10	MBA	MB
11	MCA	MC

10. Curriculum and Course Structure:

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Laboratory Courses, Audit Courses, Mandatory Courses, Comprehensive Examination / Mini Project, Internship and Project work. The list of elective courses may include subjects from allied disciplines also.

Assigning of Credits: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours / week as follows.

- **Contact classes (Theory):** 1 credit per lecture hour per week.
- **Laboratory Hours (Practical):** 1 credit for 2 Practical hours, per week.

10.1 Course Structure:

Every program of study shall be designed to have 38-42 theory courses and 17-22 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with average credits as listed in the Table 2. In this, a student has to carry out a mini project, project work and comprehensive Examination also.

Table 2: Category-wise Distribution of Credits

S.No.	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management courses	HS (05% to 10%)	10.5
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (15% to 20%)	21
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (15% to 20%)	24
4	Professional Subjects-Core (PC), relevant to the chosen specialization / branch.	PC (30% to 40%)	51

5	Professional Elective Courses (PE), relevant to the chosen specialization / branch.	PE (10% to 15%)	15
6	Open Elective Courses (OE), from other technical and / or emerging subject area.	OE (05% to 10%)	12
7	Project Work, Internship Mini Project / Comprehensive Examination.	10% to 15%	16.5
8	Mandatory Courses	MC	Non-credit
9	Skill Oriented Courses	SC	10
TOTAL			**160**

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

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

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

10.5 There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he has not studied the same course in any form during the Programme.

10.6 A student shall be permitted to pursue up to a maximum of two open elective courses under MOOCs during the Programme as mentioned in course structure. Each of the courses must be of minimum 8 - 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

10.6.1 In case a student fails to complete the MOOC / MOOCs in the stipulated semester he has to re-register and complete the same. In case any provider discontinues the course, Institution shall allow the student to opt for any other course from the list provided by the department from time to time.

10.6.2 Students have to acquire a certificate from the agencies approved by the BOS with grading or percentage of marks in order to earn 3 credits.

10.6.3 The certificate submitted by the student will be duly verified and attested by the concerned BOS chairman, and the same will be forwarded to examination branch before the end of the stipulated semester.

10.7 The department shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. Elective course shall be offered by the Department only if a minimum of 20 percent of students in the class / section strength register for that course.

10.8 Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme. There shall also be mandatory full internship in the final semester of the Programme along with the project work.

10.9 There shall be 05 skill-oriented courses offered during II B.Tech I Semester to IV B.Tech I Semester. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.

10.10 Under graduate Degree with Honors/Minor shall be issued by the University, upon the recommendation of the college, to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.

11. Evaluation Methodology:

11.1 Theory Course:

Each theory course will be evaluated for a total of 100 Marks, with 40 Marks for Continuous Internal Assessment (CIA) and 60 Marks for Semester End Examination (SEE).

11.2 Continuous Internal Assessment (CIA):

The distribution of marks for Continuous Internal Assessment is as follows:

Two Sessional Examinations : 30 Marks

Five Assignments	: 10 Marks
	40 Marks

11.3 Question Paper Pattern for Sessional Examinations:

11.3.1 Each sessional exam question paper consists of two parts, namely Part A and Part B. Part A is compulsory which carries 10 marks and consists of five short answer type questions with each carrying 2 marks. In Part B, 4 essay type questions with internal choice (either or type) each carrying 5 marks may be given. The questions may be set as per Bloom's Taxonomy. Time duration for each sessional exam is 2 hours. Internal marks for sessional examinations shall be arrived at by considering the marks secured by the student in both the sessional examinations with 80% weightage to the better sessional exam and 20% to the other.

11.3.2 Five assignments, each one for 10 marks shall be given to the students at the end of each unit. Internal marks for the assignments shall be awarded by considering the average of the five assignments.

11.4 Semester End Examination (SEE):

The SEE is conducted for 60 marks of 3 hours duration. The syllabus for the theory course is divided into FIVE units. SEE Question Paper consists of two parts, Part A and Part B.

Part A consists of 05 short answer type questions, each carries 2 marks for a total of 10 marks with no choice.

Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 10 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome based education.

11.5 Laboratory Course:

Each Laboratory Course will be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment (CIA) and 60 marks for semester end lab examination. Out of 40marks of CIA, continuous lab assessment (SEE) for day to day performance will be done for 20 marks, final internal lab examination carries 15 marks and Viva-Voce carries 5 marks. The semester end lab examination for 60 marks shall be conducted by two examiners, one of them being internal examiner (subject teacher) and the other being external examiner (other than the teacher handled) to be nominated by the Principal from the panel of experts as recommended by the Chairman, BOS. The scheme of valuation for the 60 Marks will be informed to the students in advance by the concerned Chairman, BOS and displayed in the laboratory during the beginning of the semester.

11.6. Drawing Courses:

All the **drawing** related courses are evaluated in line with laboratory courses. The distribution shall be 40 marks for internal evaluation (20 marks for day to day work and 20 marks for final internal test) and 60 marks for semester end examinations.

- **Question paper pattern for drawing courses will be followed as mentioned in the syllabus.**

  The following course is considered as theory subject, but for all practical purposes examination will be conducted like practical.

  i. Computer Aided Engineering Drawing

11.7 Mandatory Courses:

Mandatory courses will not carry any credits; but, a pass in the examination during the programme shall be necessary requirement for student to qualify for the award of Degree. The student is declared pass in each such course after securing 40% of the marks in internal examination. Evaluation will be done by conducting descriptive examination at the end of the semester for 100 marks, internally. Its result shall be declared with "satisfactory" (Pass) or Not Satisfactory (Fail) performance. Attendance is mandatory for these courses**.**

The examination will be conducted for 100 marks of 3 hours duration. The syllabus for the course is divided into FIVE units. The Question Paper consists of two parts, Part A and Part B. Part A consists of 5 short answer type questions, each carries 5 marks for a total of 25 marks with no choice. Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 15 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome-based education.

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

11.9 Project Work:

There shall be a Project Work in the IV-year second semester which carries 12 credits. Out of 100 marks allotted for the project work, 40 marks shall be for Internal Evaluation and 60 marks for the End Semester Examination (Viva – Voce). The Viva – Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the

Principal from the panel of examiners recommended by Chairman, BOS. The Evaluation of project work shall be conducted at the end of the IV year – II semester. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his project.

11.10 Framework for Mandatory Internships:

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

11.10.2 Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee. The report and theoral presentation shall carry 40% and 60% weightages respectively.

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

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

11.11 Framework for Skill Oriented Courses:

11.11.1 For skill oriented/skill advanced courses, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.

11.11.2 Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

11.11.3 A pool of interdisciplinary job-oriented skill courses shall be designed by a Common Board of studies by the participating departments / disciplines and the syllabus along with the prerequisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.

11.11.4 The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries / Professional bodies / APSSDC or any other accredited bodies as approved by the concerned BoS.

11.11.5 The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.

11.11.6 If a student chooses to take a Certificate Course offered by industries / Professional bodies / APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency / professional bodies as approved by the Board of studies.

11.11.7 If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

11.11.8 A committee shall be formed at the level of the college to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. There commended conversions and appropriate grades/marks are to be approved by the Academic Council.

11.12 Gap Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The HOD of the respective department shall forward such proposals submitted by the students to the Principal. An evaluation committee shall be constituted by the Principal to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit student (s) to avail the Gap Year.

11.13 Frame work for Minor Degree in a Discipline (Minor Degree / Programme):

The concept of Minor degree is introduced in the curriculum of all B. Tech. programs offering a Major degree. The main objective of Minor degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B.Tech Program. In order to earn a Minor degree in a discipline, a student has to earn 20 extra credits, by studying FIVE courses each carrying four credits (in each course, three credits for theory and one credit for lab).

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

b) Student can also opt for industry relevant tracks of any branch to obtain the minor degree. For example, a B.Tech Mechanical Engineering student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track, etc.

11.13.1 Students having a CGPA of 8.0 or above up to II B.Tech I-Semester without any backlogs shall be permitted to register for Minor degree.

11.13.2 An SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration live or else it shall be cancelled.

11.13.3 Students aspiring for a Minor degree must register from II B.Tech II-Semester onwards and must opt for a Minor in a discipline other than the discipline he is registered in or any industry relevant track of any branch.

11.13.4 The Evaluation pattern of the courses shall be similar to the regular program courses evaluation.

11.13.5 Minimum strength required for offering a Minor in a discipline is considered as 20% of the class size and Maximum should be 80% of the class size.

11.13.6 Minor degree program should be completed by the end of IV B. Tech I-Semester.

11.13.7 A student registered for Minor degree shall pass in all subjects that constitute the requirement for the Minor degree program. No class / division (i.e., second class, first class and distinction, etc.) shall be awarded for Minor degree program.

11.13.8 The Minor degree shall be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Computer Science & Engineering with Minor in Electronics & Communication Engineering or the chosen industry relevant track. This shall also be reflected in the transcripts, along with the list of courses taken for Minor degree program with CGPA mentioned separately.

11.13.9 Separate course/class work and time table shall be arranged for the various Minor degree programs. Attendance regulations for these Minor discipline programs shall be as per regular courses.

NOTE: Interested meritorious students shall be permitted to register either for Minor degree in a discipline or industry relevant track of any branch (or) Honors Degree in a discipline only, but not both.

11.14 Framework for Honors Degree in a Discipline:

11.14.1 This concept is introduced in the curriculum for all conventional B. Tech. programmes.

The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Honors degree in his/her discipline, a student has to earn 20 extra credits by studying five advanced courses each carrying four credits for 20 credits in the concerned branch of Engineering. In place of advanced courses, he can study equivalent MOOC courses available under SWAYAM / Other platform, as decided by the institution from time to time. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation. Students aspiring for Honors degree must register from II B.Tech, II Semester onwards. However, Honors degree registrations are not allowed before II B.Tech, II Semester and after III B.Tech, I Semester.

11.14.2 Students having a CGPA of 8.0 or above up to II year-I semester and without any backlog subjects will be permitted to register for degree with Honors. The SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the degree with Honors registration live or else it will be cancelled.

NOTE: Interested meritorious students shall be permitted to register either for Honors degree or Minor degree in a discipline or industry relevant track of any branch but not both.

12. Attendance Requirements and Detention Policy:

12.1 A student shall be eligible to appear for Semester – End examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects in a semester.

12.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds by the College Academic Committee. A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

12.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned and the candidate will be detained.

12.4 Detained students are not eligible to take their end examination of that class and their registration shall stand cancelled.

12.5 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

13. Conduct of Semester End Examination and Evaluation:

13.1 Semester end examination shall be conducted by the Controller of Examination (COE) by inviting 50% Question Papers from the External and 50% Question papers from the Internal Subject Experts. Principal will decide the External and Internal subject experts.

13.2 The answer papers of semester end examination should be evaluated externally / internally.

13.3 The marks for the internal evaluation components will be added to the external evaluation marks secured in the Semester – End examinations, to arrive at total marks for any subject in that semester.

13.4 Performance in all the subjects is tabulated program-wise and will be scrutinized by the office of the Controller of Examinations. Total marks obtained in each subject are converted into letter grades. Finally subject-wise marks and grades details, subject-wise and branch-wise pass percentages are calculated through software.

13.5 Results Committee:

Results Committee comprising of Principal, Controller of Examinations, Additional Controller of Examinations (Confidential), One Senior Professor nominated by the Principal and the University Nominee will oversee the details of marks, grades and pass percentages of all the subjects and branch-wise pass percentages.

13.6 Office of the Controller of Examinations will generate student-wise result sheets and the same will be published through college website.

13.7 Student-wise Grade Sheets are generated and issued to the students.

14. Academic Requirements for Promotion / Completion of Regular B.Tech Programme of Study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion / completion of regular B.Tech Program of study.

14.1 For Students Admitted in B.Tech (Regular) Program:

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design drawing subject or project, if he secures not less than 35% of marks in the Semester End examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.

ii. A student shall be promoted from second year to third year only if he fulfills the academic requirement of securing **33** credits from:

a) Two Regular and two Supplementary Examinations of I-Year I Semester.
b) Two Regular and one Supplementary Examinations of I-Year II Semester.
c) One Regular and one Supplementary Examination of II-Year I semester.
d) One Regular Examination of II-Year II Semester.

Irrespective of whether the candidate appear for Semester-End Examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year Program of study only if he fulfills the academic requirements of securing **50** credits from:

a) Three Regular and Three Supplementary Examinations of I-Year I Semester.
b) Three Regular and Two Supplementary Examinations of I-Year II Semester
c) Two Regular and Two Supplementary Examination of II-Year I Semester.
d) Two Regular and One Supplementary Examinations II-Year II Semester.
e) One Regular and One Supplementary examination of III-Year I Semester.
f) One Regular Examination of III-Year II semester.

Irrespective of whether the candidate appears for the Semester-End examination or not as per the normal course of study and in case of getting detained for want of credits by sections 14.1 (ii) and 14.1 (iii) above, the student may make up the credits through supplementary examinations before the date of commencement of class work for III Year I Semester or IV Year I Semester as the case may be.

iv. A student shall register for all the **160** credits and earn all the **160** credits. Marks obtained in all the **160** credits shall be considered for the award of the class based on CGPA.

v. A student who fails to earn **160** credits as indicated in the course structure within eight academic years from the year of his admission shall forfeit his seat in B. Tech., Program and his admission stands cancelled.

vi. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vii. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

14.2 For Lateral Entry Students:

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the Semester-End examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.

ii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing **34** credits from the following examinations.

a) Two Regular and Two Supplementary Examinations of II Year I Semester.
b) Two Regular and One Supplementary Examination of II Year II Semester.
c) One Regular and One Supplementary Examination of III Year I Semester.
d) One Regular Examination of III-Year II Semester.

Irrespective of whether the candidate appear the Semester-End examination or not as per the normal Course of study and in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV Year I Semester.

iii. A student shall register for all **121** credits and earn all the **121** credits. Marks obtained in all **121** credits shall be considered for the award of the class based on CGPA.

iv. A student who fails to earn **121** credits as indicated in the course structure within six academic years from the year of his admission shall forfeit his seat in B.Tech., Program and his admission stands cancelled.

v. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vi. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

15. Letter Grades and Grade Points:

15.1 Performances of students in each course are expressed in Letter Grades based on absolute grading system. The UGC recommends a 10-point grading system with the following letter grades as given in the Table 3.

Table 3: Grade Points Scale (Absolute Grading)

Percentage of Marks	Grade Point	Letter Grade
90-100	10	S (Outstanding)
80-89	9	A+ (Excellent)
70-79	8	A (Very Good)
60-69	7	B+ (Good)
50-59	6	B (Above Average)
45-49	5	C (Average)
40-44	4	D (Pass)
Below 40	0	F (Fail)
Absent	0	N (Absent)

15.2 A student obtaining Grade F shall be considered Failed and will be required to re-appear in the examination.

15.3 For non credit courses, 'P' for 'Satisfactory' or 'F' for 'Not Satisfactory' is indicated and this will not be counted for the computation of SGPA / CGPA.

15.4 At the end of each semester, the institute issues grade sheet indicating the SGPA and CGPA of the student. However, grade sheet will not be issued to the student if he has anyoutstanding dues.

16.0 Computation of SGPA and CGPA:

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

$$SGPA = \Sigma\ (Ci \times Gi)/\ \Sigma\ C_i$$

where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith course

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

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

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

16.3 Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the Grade Sheets.

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

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

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

16.7 As per AICTE regulations, conversion of CGPA into equivalent percentage is as follows:

Equivalent Percentage to SGPA = (SGPA – 0.50) x 10

Equivalent Percentage to CGPA = (CGPA – 0.50) x 10

17. Grade Sheet:

A grade sheet will be issued to each student indicating his performance in all subjects registered in that semester indicating the SGPA and CGPA. SGPA and CGPA will be rounded off to the second place of decimal.

18. Consolidated Grade Sheet:

After successful completion of the entire Program of study, a Consolidated Grade Sheet containing performance of all academic years will be issued as a final record. Transcripts will also be issued, if required, after payment of requisite fee.

19. Award of Degree:

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendation of the Principal of SVCET (Autonomous), Chittoor

19.1 Eligibility:

A student shall be eligible for the award of B.Tech Degree if he fulfills all the following conditions:

- ➢ Registered and successfully completed all the components prescribed in the program of study for which he is admitted.
- ➢ Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- ➢ Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed.)

19.2. Award of Class:

Declaration of Class is based on CGPA

Cumulative Grade Point Average	Class
≥7.5	First Class with Distinction
≥6.5 and<7.5	First Class
≥5.5 and <6.5	Second Class
≥4.0 and<5.5	Pass Class

20. Personal Verification / Recounting / Revaluation / Final Valuation

20.1 Personal Verification of Answer Scripts:

Candidates appear in a particular semester end examinations may appeal for verification of their answer script(s) for arithmetic correction in totaling of marks and any omission / deletion in evaluation as per the notifications issued from time to time in the prescribed proforma and by paying the prescribed fee per answer script.

It is clarified that personal verification of answer script shall not tantamount to revaluation of answer script. This is only a process of reverification by the candidate. Any mistake / deficiency with regard to arithmetic correction in totaling of marks and any omission / deletion in evaluation if found, the institution will correct the same.

20.2 Recounting / Revaluation:

Students shall be permitted for request for recounting/revaluation of the Semester-End examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised grade sheet. If there are no changes, the same will be intimated to the students.

20.3 Final Valuation:

Students shall be permitted for request for final valuation of the Semester–End Examination answer scripts within a stipulated period after the publication of the revaluation results by paying the necessary fee. The final valuation shall be carried out by an expert not less than Associate Professor as per the scheme of valuation supplied by the examination branch in the presence of the student, Controller of Examinations and Principal. However, students are not permitted to discuss / argue with the examiner. If the increase in marks after final valuation is equal to or more than 15% of the previous valuation marks, the marks obtained after final valuation shall be treated as final. If the variation of marks after final valuation is less than 15% of the previous valuation marks, then the earlier valuation marks shall be treated as the final marks.

21. Supplementary Examinations:

In addition to the regular semester-end examinations conducted, the college may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

22. Termination from the Program:

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

a. The student fails to satisfy the requirements of the program within the maximum period stipulated for the program.
b. The student fails to satisfy the norms of discipline specified by the institute from time to time.

23. With-Holding of Results:

If the candidate has not paid any dues to the institute / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

24. Graduation Day:

The institute shall have its own annual Graduation Day for the award of Provisional Certificates to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

25. Discipline:

Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he shall be liable for punitive action as prescribed by the Institute from time to time.

26. Grievance Redressal Committee:

The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

27. Transitory Regulations:

Students who got detained for want of attendance (or) who have 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 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 continue to be in the academic regulations of the batch they join later. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years, for the award of B.Tech Degree.

28. Mode of Learning:

Preferably 50% course work for the Theory courses in every semester shall be conducted in the blended mode of learning. If the blended learning is carried out in online mode, then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

29. Student Transfers:

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

Students admitted on transfer from JNTU affiliated institutes, Universities and other institutes are required to pass all the subjects studied in the previous institution. Further, the students who have passed some of the subjects at the earlier institution, if the same subjects are prescribed in different semesters in the transferred institutions, the student has to study the substitute subjects as prescribed by concerned 'Board of Studies'.

30. General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Disciplinary action for Malpractice/improper conduct in examinations is appended.
iii. Where the words " he" , " him" , " his" , occur in the regulations, they include" she" , " her"," hers" .
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
v. The Principal may change or amend the academic regulations of common BOS or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Principal.
vi. The above rules and regulations are to be approved/ratified by the College Academic Council as and when any modification is to be done.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

ANNEXURE – I

COMMUNITY SERVICE PROJECT

Allocation of Community Service Project for the students will be done as per the decision of the concerned BOS Chairman

Introduction:

Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.

Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective:

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

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.

- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project:

- Every student should put in a minimum of 180 hours for the Community Service Project during the summer vacation.

- Each class/section should be assigned with a mentor.

- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc

- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The log book has to be countersigned by the concerned mentor/faculty in-charge.

- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.

- The final evaluation to be reflected in the grade memo of the student.

- The Community Service Project should be different from the regular programmes of NSS / NCC / Green Corps / Red Ribbon Club etc.,

- Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.

- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure:

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

- The Community Service Project is a twofold one –

  - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the village or ward volunteers, rather, it could be another primary source of data.

  - *Secondly, the student/s could take up a social activity, concerning their domain or* subject area. The different areas, could be like –

    - *Agriculture*
    - *Health*
    - *Marketing and Cooperation*
    - *Animal Husbandry*
    - *Horticulture*
    - *Fisheries*
    - *Sericulture*
    - *Revenue and Survey*
    - *Natural Disaster Management*
    - *Irrigation*
    - *Law & Order*
    - *Excise and Prohibition*
    - *Mines and Geology*
    - *Energy*
    - *Internet*
    - *Free Electricity*
    - *Drinking Water*

EXPECTED OUTCOMES:

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS:

Learning Outcomes:

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity Personal Outcomes
- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills Social Outcomes
- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation Career Development
- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater Opportunity Relationship with the Institution
- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS:

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

BENEFITS OF COMMUNITY SERVICE PROJECT TO THE INSTITUTION:

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

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY:

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

RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper Conduct	Punishment
	If the candidate	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
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 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 to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of 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 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.

5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of 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 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.
6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits of seat.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8.	Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-	In 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 also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against

	in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	them.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges 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. 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.	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.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the 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 Examination committee for further action to award suitable punishment.	

Induction Program: 3 weeks
(Common for All Branches of Engineering)
Semester-0

S.No	Category	Course code	Course title	Hours per week			Credits
				L	T	P	
1	MC		Physical Activities -- Sports, Yoga and Meditation, Plantation	0	0	6	0
2	MC		Career Counseling	2	0	2	0
3	MC		Orientation to all branches -- career options, tools, etc.	3	0	0	0
4	EC		Orientation on admitted Branch -- corresponding labs, tools and platforms	2	0	3	0
5	ES		Proficiency Modules & Productivity Tools	2	1	2	0
6	MC		Assessment on basic aptitude and mathematical skills	2	0	3	0
7	MC		Remedial Training in Foundation Courses	2	1	2	0
8	MC		Human Values & Professional Ethics	3	0	0	0
9	BS		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2	1	2	0
10	ES		Concepts of Programming	2	0	2	0
Total				**20**	**3**	**22**	**0**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
With Specialization in
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Course Structure & Scheme of Examination

I B. Tech I Semester

S. NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS02	Differential Equations and Multivariable Calculus	3	1	0	3	40	60	100
2	BS	20AHS04	Engineering Physics	3	0	0	3	40	60	100
3	ES	20ACS01	C Programming and Data Structures	3	1	0	3	40	60	100
4	ES	20AME01	Computer Aided Engineering Drawing	1	0	4	3	40	60	100
5	ES	20ACS02	Computational Thinking	3	0	0	3	40	60	100
6	BS	20AHS07	Engineering Physics Lab	0	0	3	1.5	40	60	100
7	ES	20ACS03	C Programming and Data Structures Lab	0	0	3	1.5	40	60	100
8	ES	20AME02	Engineering Practice Lab	0	0	3	1.5	40	60	100
9	MC	20AHS09	Environmental Sciences	2	0	0	-	100	00	100
Total				**15**	**2**	**13**	**19.5**	**420**	**480**	**900**

I B.Tech II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	HS	20AHS01	Communicative English	3	0	0	3	40	60	100
2	BS	20AHS03	Engineering Chemistry	3	0	0	3	40	60	100
3	BS	20AHS08	Algebra and Transformation Techniques	3	1	0	3	40	60	100
4	ES	20AEE05	Basic Electrical Engineering	3	1	0	3	40	60	100
5	ES	20ACS04	Problem Solving and Programming Using Python	3	1	0	3	40	60	100
6	HS	20AHS05	Communicative English Lab	0	0	3	1.5	40	60	100
7	ES	20ACS05	Problem Solving and Programming Using Python Lab	0	0	3	1.5	40	60	100
8	BS	20AHS06	Engineering Chemistry Lab	0	0	3	1.5	40	60	100
9	MC	20AMB01	Design Thinking	2	0	0	-	100	00	100
10		20ANSS1/ 20ANCC1	NSS/NCC	0	0	2	-	-	-	-
Total				**17**	**3**	**11**	**19.5**	**420**	**480**	**900**

II B.Tech., I Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS10	Numerical Methods	3	1`	0	3	40	60	100
2	PC	20ACS06	Computer Organization and Architecture	3	0	0	3	40	60	100
3	PC	20ACS07	Object Oriented Programming through JAVA	3	0	0	3	40	60	100
4	PC	20AIT01	Automata & Compiler Design	3	0	0	3	40	60	100
5	PC	20ACS08	Relational Database Management Systems	3	0	0	3	40	60	100
6	PC LAB	20ACS09	Object Oriented Programming through JAVA Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AIT02	Automata & Complier Design Lab	0	0	3	1.5	40	60	100
8	PC LAB	20ACS10	Relational Database Management Systems Lab	0	0	3	1.5	40	60	100
9	SC	20ACM01	Web Application Development	1	0	2	2	40	60	100
10	MC	20AMB02	Universal Human Values-I	2	0	0	-	100	00	100
11	AC	20AHS11	Quantitative Aptitude and Reasoning-I	2	0	0	-	-	-	-
12		20ANSS1/ 20ANCC1	NSS/ NCC	0	0	2	-	-	-	-
TOTAL				**20**	**0**	**13**	**21.5**	**460**	**540**	**1000**

II B.Tech., II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	*T*	P		CIA	SEE	Total
1	BS	20AHS13	Probability & Statistics	3	1	0	3	40	60	100
2	ES	20AHS14	Discrete Structures and Graph Theory	3	1	0	3	40	60	100
3	PC	20ACM02	Artificial Intelligence for Engineers	3	0	0	3	40	60	100
4	PC	20ACS13	Operating Systems	3	0	0	3	40	60	100
5	PC	20AIT04	Software Engineering	3	0	0	3	40	60	100
6	PC LAB	20ACM03	Artificial Intelligence Lab	0	0	3	1.5	40	60	100
7	PC LAB	20ACS15	Operating Systems Lab	0	0	3	1.5	40	60	100
8	PC LAB	20AIT05	Software Engineering Lab	0	0	3	1.5	40	60	100
9	SC	20ACD04	Data Analytics with R	1	0	2	2	40	60	100
10	AC	20AHS15	Quantitative Aptitude and Reasoning-II	2	0	0	-	-	-	-
TOTAL				**18**	**0**	**11**	**21.5**	**360**	**540**	**900**
Honor Degree hours distribution **4-0-0-4**										
Internship 2 Months (Mandatory) during summer vacation/Community Service Project (to be evaluated during III year I Sem)										

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
With Specialization in
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Course Structure & Scheme of Examination

III B.Tech I Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	HSS	20AMB03	Managerial Economics and Financial Analysis	3	0	0	3	40	60	100
2	PC	20ACS16	Web Technologies	3	0	0	3	40	60	100
3	PC	20ACS17	Computer Networks	3	0	0	3	40	60	100
4	PE	**Professional Elective-I**		3	0	0	3	40	60	100
		20ACS12	Design and Analysis of Algorithms							
		20ACS18	Cryptography and Network Security							
		20AIT10	Human Computer Interaction							
		20ACM04	Pattern Recognition							
		20ACM05	Artificial Neural Network							
5	OE/JOE	**Open Elective/Job Oriented Elective-I**		3	0	0	3	40	60	100
		20AEC31	Digital Logic Design							
		20ACE35	Integrated Waste Management for Smart City							
		20AME18	Robotics and Artificial Intelligence							
		20ACD08	Single Page Web Applications with AngularJS							
		20ACD09	Distributed Database and Information Systems							
6	PC LAB	20ACS25	Web Technologies Lab	0	0	3	1.5	40	60	100
7	PC LAB	20ACS26	Computer Networks Lab	0	0	3	1.5	40	60	100
8	SC	20AHS16	Advanced English Communication Skills Lab	1	0	2	2	40	60	100
9	MC	20AHS21	Indian Constitution	2	0	0	-	100	00	100
10	AC	20AHS17	Quantitative Aptitude and Reasoning-III	2	0	0	-	-	-	-
11	AC	20AHS18	French Language	2	0	0	-	-	-	-
		20AHS19	German Language							
		20AHS20	Japanese Language							
12	20ACM06/20ACM46		Summer Internship /Community Service Project	0	0	0	1.5	40	60	100
TOTAL				**22**	**0**	**08**	**21.5**	**460**	**540**	**1000**
Honor Degree hours distribution **3-1-0-4**										
Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**										

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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Course Structure & Scheme of Examination

III B.Tech., II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SE E	Total
1	PC	20ACD11	Big Data Computing	3	0	0	3	40	60	100
2	PC	20ACM07	Introduction to Machine Learning	3	0	0	3	40	60	100
3	PC	20ACM08	Deep Learning	3	0	0	3	40	60	100
4	PE	**Professional Elective-II**		3	0	0	3	40	60	100
		20AIT13	Software Project Management							
		20ACD15	Knowledge Management							
		20ACM09	AI and Robotics Programming							
		20ACM10	Virtual and Augmented reality							
		20ACM11	Bio-Inspired Computing							
5	OE/JOE	**Open Elective/Job oriented Elective-II**		3	0	0	3	40	60	100
		20AEC45	Microprocessor and Interfacing							
		20AME31	Operation Research							
		20AMB09	Intellectual Property Rights							
		20ACM12	Go Programming Language							
		20ACM13	Business Intelligence							
6	PC LAB	20ACD19	Big Data Analytics with Hadoop andSpark Lab	0	0	3	1.5	40	60	100
7	PC LAB	20ACM14	Machine learning Essentials Lab	0	0	3	1.5	40	60	100
8	PC LAB	20ACM15	Deep Learning Lab	0	0	3	1.5	40	60	100
9	SC	20ACD22	Shell Programming	1	0	2	2	40	60	100
10	MC	20AHS23	Essence of Indian Traditional Knowledge	2	0	0	-	100	00	100
			TOTAL	**18**	**0**	**08**	**21.5**	**460**	**540**	**1000**
Honor Degree hours distribution **3-1-0-4**										
Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**										
Industrial/Research Internship (Mandatory)2 Months during summer vacation (to be evaluated during IV year I Sem)										

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

With Specialization in

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Structure & Scheme of Examination

III B.Tech., I Semester

S.NO	Category	Course code	Course Title	Periods per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	HSS		**Humanities and Social Science Elective**	3	0	0	3	40	60	100
		20AMB04	Creativity and Innovation							
		20AMB05	Leadership Essentials							
		20AMB06	Law for Engineers							
		20AMB07	Entrepreneurship Essentials							
		20AMB08	Essentials of Management Science							
2	PE		**Professional Elective-III**	3	0	0	3	40	60	100
		20AIT20	Software Testing							
		20ACS39	Cloud Computing							
		20ACM16	Video and Image Processing							
		20ACM17	Block Chain Technology							
		20ACM18	Statistical Natural Language Processing							
3	PE		**Professional Elective-IV**	3	0	0	3	40	60	100
		20AIT24	Software Quality Assurance and Testing							
		20ACM19	AI for Engineering Applications							
		20ACM20	Applications of Machine Learning in Industries							
		20ACM21	AI and Gaming Application							
		20ACM22	AI in Speech Processing							
4	PE		**Professional Elective-V**	3	0	0	3	40	60	100
		20ACS28	Internet of Things (IoT)							
		20ACS46	Computer Vision							
		20ACM23	Machine Learning for Engineering and Science Applications							
		20ACM24	Smart Sensing Structures and AI							
		20ACM25	Ethics for AI							
5	OE/JOE		**Open Elective/Job oriented Elective-III**	3	0	0	3	40	60	100
		20AEC56	Embedded Systems							
		20AME54	Optimization Techniques							
		20AMB10	Industrial Marketing							
		20ACS47	NoSQL Databases							
		20ACM26	Machine Learning Tools and Techniques							
6	OE/JOE		**Open Elective/Job oriented Elective-IV**	3	0	0	3	40	60	100
		20AEC51	Digital Image Processing							
		20AME20	Total Quality Management and Reliability Engineering							
		20AMB11	Social Media Marketing							
		20ACS49	DevOps							
		20ACM27	Haskell Programming							
7	SC	20ACS11	Android Application Development	1	0	2	2	40	60	100
8	MC	20AMB12	Professional Ethics	2	0	0	-	100	00	100
9		20ACM28	Industry / Research Internship	0	0	0	3	40	60	100
			TOTAL	**21**	**0**	**05**	**23**	**420**	**480**	**900**

Honor Degree hours distribution **3-1-0-4**

Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution **3-1-0-4**

Course Structure & Scheme of Examination

IV B.Tech., II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	Major Project	20ACM29	**Project** Project work, seminar and internship in industry	0	0	0	12	80	120	200
INTERNSHIP (6 MONTHS)										
TOTAL										**12**

1. **HONORS DEGREE:** Students has to acquire 20 credits with minimum one subject from each pool @ 4 credits per subject.

SNo	Offered in	Course Code	Course Name	L	T	P	C	Scheme of Examination (Maximum Marks)			Pre-Requisites	OfferedTo
								CIA	SEE	Total		
POOL1												
1	**II-II** (Any 1 Course from POOL-I)	20ACS53	Real Time Systems	3	1	0	4	40	60	100	Computer Organization and Architecture	CSE [AI&ML]
2		20ACS54	Soft Computing and Neural Networks	3	1	0	4	40	60	100	Computational Thinking	CSE [AI&ML]
3		20ACS55	Advanced Databases	3	1	0	4	40	60	100	Relational Database Management Systems	CSE [AI&ML]
4		20ACS56	Natural Language Processing	3	1	0	4	40	60	100	Computational Thinking	CSE [AI&ML]
POOL 2												
1	**III-I** (Any 1 Course from POOL-II)	20ACM30	AI: Knowledge Representation and Reasoning	3	1	0	4	40	60	100	Natural Language Processing	CSE [AI&ML]
2		20ACM31	Security Assurance and Evaluation	3	1	0	4	40	60	100	Operating System	CSE [AI&ML]
3		20ACM32	System Modellingand Simulation	3	1	0	4	40	60	100	Software Engineering	CSE [AI&ML]
4		20ACM33	Robotic Sensors	3	1	0	4	40	60	100	Artificial Intelligence for Engineers	CSE [AI&ML]
POOL 3												
1	**III - II** (Any 1 Course from POOL-III)	20ACM34	Artificial Intelligence Search Methods	3	1	0	4	40	60	100	Design and Analysis of Algorithm	CSE [AI&ML]
2		20ACM35	Green computing	3	1	0	4	40	60	100	Operating System	CSE [AI&ML]
3		20ACM36	Brain Computer Interaction	3	1	0	4	40	60	100	Pattern Recognition	CSE [AI&ML]
4		20ACM37	Mobile Robotics	3	1	0	4	40	60	100	Object Oriented Programming Through Java	CSE [AI&ML]
POOL 4												
1	**III- II** (Any 1 Course from POOL-IV)	20ACM38	Industrial IoT	3	1	0	4	40	60	100	Data Analytics with Python	CSE [AI&ML]
2		20ACM39	Database and Cloud Data Control	3	1	0	4	40	60	100	Relational Database Management Systems	CSE [AI&ML]
3		20ACM40	Mobile User Interface Development	3	1	0	4	40	60	100	Human Computer Interaction	CSE [AI&ML]
4		20ACM41	Virtualization and Containerization	3	1	0	4	40	60	100	Operating System	CSE [AI&ML]
POOL 5												
1	**IV-I** (Any 1 Course from POOL-V)	20ACM42	Stream Processing and Analytics	3	1	0	4	40	60	100	Data Analytics	CSE [AI&ML]
2		20ACM43	Self-Driving Car	3	1	0	4	40	60	100	Deep Learning	CSE [AI&ML]
3		20ACM44	Machine Learning for Bioinformatics	3	1	0	4	40	60	100	Machine Learning Essentials	CSE [AI&ML]
4		20ACM45	Mobile VR and AI in Unity	3	1	0	4	40	60	100	Virtual and Augmented reality	CSE [AI&ML]

1. **Minor Degree (Industry relevant Track) A student can opt Five subjects from each track @ 4 credits per subject (offered to CSE, IT, CSE (DS) and CSE(AIML) only)**

BLOCK CHAIN

S.NO	Year & Sem	Course code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	**II-II**	20ACS73	Fundamentals of Block chain	**3**	**1**	**0**	**4**	Basics of cryptography	CSE
2	**III-I**	20ACS74	Smart Contracts and Solidity	**3**	**1**	**0**	**4**	Fundamentals of blockchain and Programming concepts	CSE
3	**III-II**	20ACS75	Block chain Platforms and Use cases	**3**	**1**	**0**	**4**	NIL	CSE
4	**III-II**	20ACS76	Block chain Security and Performance	**3**	**1**	**0**	**4**	Security Concepts	CSE
5	**IV-I**	20ACS77	Block chain and FinTech	**3**	**1**	**0**	**4**	NIL	CSE
			Total				**20**		

WEB DESIGNING

S.NO	Year & Sem	Course code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	**II-II**	20ACS78	HTML5 & CSS3	**3**	**1**	**0**	**4**	NIL	CSE
2	**III-I**	20ACS79	Web Application Development with PHP	**3**	**1**	**0**	**4**	HTML5 & CSS3	CSE
3	**III-II**	20ACS80	Django Framework	**3**	**1**	**0**	**4**	Python	CSE
4	**III-II**	20ACS81	Full stack React	**3**	**1**	**0**	**4**	Web Technologies	CSE
5	**IV-I**	20ACS82	Full stack Development using Node.js, Type script	**3**	**1**	**0**	**4**	HTML5, PHP, JAVASCRIPT	CSE
			Total				**20**		

CYBER SECURITY

S.NO	Year & Sem	Course code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	**II-II**	20ACS83	Information Theory for Cyber Security	**3**	**1**	**0**	**4**	CNS	CSE
2	**III-I**	20ACS84	Steganography and Digital Watermarking	**3**	**1**	**0**	**4**	cryptography	CSE
3	**III-II**	20ACS85	Security Policy and Governance	**3**	**1**	**0**	**4**	cryptography	CSE
4	**III-II**	20ACS86	Security Assessment and Risk Analysis	**3**	**1**	**0**	**4**	SE, CRYPTOGRAPHY	CSE
5	**IV-I**	20ACS87	Database Security and Access Control	**3**	**1**	**0**	**4**	DBMS	CSE
			Total				**20**		

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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I B.Tech I Semester (Common to all Branches)

L	T	P	C
3	1	0	3

20AHS02 DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS

Course Outcomes:

After completion of the course the student will be able to

1. Classify and interpret the solution of ordinary differential equations.
2. Apply the principles of differential equations to the engineering and scientific problems.
3. Evaluate the double and triple integral to find surface area and volumes.
4. Analyze the results and draw possible conclusions.
5. Illustrate the physical interpretation of concepts of vector calculus.

UNIT-I

DIFFERENTIAL EQUATIONS: Linear Differential Equations – Bernoulli's Equations – Non – homogenous Linear Differential equation of second and higher order with constant coefficients with R.H.S terms of the form e^{ax}, $Sinax$, $Cosax$, x^m, $e^{ax}V(x)$, $x^mV(x)$ and $xV(x)$.

UNIT-II

APPLICATIONS OF DIFFERENTIAL EQUATIONS: Orthogonal Trajectories (Cartesian and polar forms) - Newton's law of cooling- Law of natural Growth and Decay- L- R-C circuits, bending of beams- Mass spring System

UNIT-III

FUNCTIONS OF SEVERAL VARIABLES: Partial derivatives- chain rule- Total derivative, Jocobian-Maxima and Minima for functions of two variables – Lagrange's method of multipliers of 3 variables only.

UNIT-IV

APPLICATIONS OF INTEGRATION: Length of an arc and area using integral. **Multiple Integrals**: Double and Triple integrals-Change of variables-Change of order of Integration (Cartesian and polar forms). Surface area and Volume of solid of revolution.

UNIT-V

VECTOR CALCULUS: Gradient, Divergence, Curl and their properties (without identities).

Vector Integration: Line Integrals – Potential functions – Area, Surface and Volume integrals –Green's theorem- Stoke's theorem& Gauss Divergence theorems (withoutproof) – problems on Green's, Stoke's and Gauss's Theorem.

Text Books:

1. Higher Engineering Mathematics, Dr.B.S.Grewal,.Kanna Publications, 40^{th} edition.
2. A Text book of Engineering Mathematics –I, T.K.V.Iyengar, B.Krishna Gandhi andothers, S. Chand and company.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics. John Wiley & Sons.2016
2. Thomson, A Text book of Engineering Mathematics, Book Collection
3. B.V.Ramana, A Text book of Engineering Mathematics-I, Tata Mc Grawhill.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	2	2
CO3	2	2	-	1	-	-	-	-	-	-	-	-	2	2
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	1
CO5	3	2	2	2	-	-	-	-	-	-	-	-	2	1

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS)&CSE(AI &ML))

I B.Tech II Semester (Common to CE, ME & ECE)

L	T	P	C
3	0	0	3

20AHS04 ENGINEERING PHYSICS

Course Outcomes:

After completion of the course the student will be able to,

1. Demonstrate strong fundamental knowledge in optic, lasers and optical fibers.
2. Comprehend and apply quantum mechanical principles towards the free electron theory.
3. Learn about the crystal structure, magnetic materials, semiconductors, and superconductors and their applications.
4. Propose preparation methods for different nanomaterials and relate structure of Nanomaterials with their property.

UNIT I

OPTICS

INTERFERENCE: Introduction - Principle of superposition - Conditions for sustained interference – interference in thin films by reflection – Newton's Rings - Determination of wavelength of light and refractive index of liquid.

DIFFRACTION: Introduction–Definition of Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit and double slit.

UNIT II LASERS & FIBER OPTICS

Lasers: Introduction - Laser Characteristics - spontaneous and stimulated emission of radiation - Einstein's coefficients - population inversion - Ruby laser - He-Ne laser- Applications of laser. **Fiber Optics:** Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture - Classification of Optical Fibers-Optical fiber communication system-Applications of optical fibers.

UNIT III

PRINCIPLE OF QUANTUM MECHANICS: Wave and particles - de Broglie hypotheses - de Broglie's wavelength for electron - Properties of Matter waves -Schrödinger time independent waveequation - Physical significance of wave function -Particle in one dimensional infinite potential box (qualitative only).

CRYSTAL PHYSICS: Single crystalline, Polycrystalline and amorphous materials -Fundamental of crystallography- Space lattice - Basis - unit cell - Lattice parameters - Crystal systems –Bravais Lattice - Structure and packing fraction of Simple cubic and body centered cubic - Miller Indices- Bragg's law- X-ray diffraction by powder method.

FREE ELECTRON THEORY: Electrical conductivity of Classical free electron theory and Quantum free electron theory - merits and demerits - Kronig penny model (qualitative only).

UNIT IV

SEMICONDUCTORS & SUPERCONDUCTORS

SEMI CONDUCTORS: Introduction - Intrinsic and extrinsic Semiconductors - Fermi level- Drift and diffusion - Einstein's equation - Hall Effect – LED.

SUPERCONDUCTORS: General properties of superconductors - Meissner effect - Penetration depth – Type I and Type II superconductors - Josephson effect - Application of superconductors.

UNIT V

MAGNETISM & NANOMATERIALS

MAGNETISM: Introduction and basic definitions - Origin of magnetic moment -Classification of magnetic materials - Hysteresis curve - Hard and Soft Magnetic Materials - Applications.

NANOMATERIALS: Introduction - Significance of Nano scale - Types of nanomaterials -Ball milling- Chemical vapor deposition - Properties of nanomaterials, Optical and magnetic – application of nano materials.

Text Books:

1. Engineering Physics, Thyagarajan K, Tata Mcgraw Hill Publishers, New Delhi, 2013.
2. A Text book of Engineering Physics, Avadhanulu and Kshirasagar, Revised Edition, S.Chand,New Delhi, 2014.
3. Gaur R K and Gupta S L, Engineering Physics, Dhanpat Rai Publications, New Delhi, 2010.

Reference Books:

1. Solid State Physics, Pillai. S.O, , New Age International, New Delhi, 2005.
2. Introduction to Nanoscience and Technology, Chattapadhyay K.K, Banerjee A.N, New Delhi.
3. Engineering Physics, Vijaya kumara K, , S. Chand & Company Ltd., New Delhi .

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	-	-	-	-	1	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2	
CO3	3	2	-	1	-	-	-	-	-	-	-	-	2	2
CO4	2	-	-	2	1	-	-	-	-	-	-	-	1	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B. Tech I Semester (Common to all branches)

L	T	P	C
3	1	-	3

20ACS01 - C PROGRAMMING & DATA STRUCTURES

Course Outcomes:

After Completion of the course the student will be able to

1. Analyse the basic concepts of C Programming language.
2. Design applications in C, using functions, arrays, pointers and structures.
3. Apply the concepts of Stacks and Queues in solving the problems.
4. Explore various operations on Linked lists.
5. Demonstrate various tree traversals and graph traversal techniques.

UNIT-1

Introduction to C Language - C language elements, structure of C program, A simple C program, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays, control statements-break and continue, programming examples.

UNIT – 2

Functions: Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Parameter passing mechanisms - Call-by-value, Call-by-reference, Recursion, Storage classes (auto, static, register, extern),**Arrays**: Declaration and Definition of an array, Processing an Array, Passing arrays to functions, Two dimensional and Multi- dimensional arrays**, Strings:** Defining and Initialization of Strings, NULL character, Reading and Writing a string , Processing the string , String handling functions.

UNIT-3

Pointers: Fundamentals, Pointer declarations, Pointers and One-dimensional array, Dynamic memory allocation, Operations on pointers**, Structures and Unions**: Declaration, Definition and Initialization of structures, Accessing structures, User defined data type (typedef), Enumerated Data types, Nested structures, Array of structures, Structures andpointers, Passing structures to functions, Unions.

UNIT – 4

Data Structures

Overview of data structures, stacks and queues, representation of a stack, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

UNIT-5

Trees - Tree terminology, Binary trees, representation, binary tree traversals. Binary tree operations, Graphs - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees.

Searching and Sorting – sequential search, binary search, exchange (bubble) sort, selection sort, Insertion sort.

Text Books:

1. Behrouz A. Forouzan, Richard F. Gilberg, ―C Programming & Data Structures‖, India Edition, Course Technology, 2010.
2. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition,Prentice Hall Publication.
3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed,Computer Science Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao,Pearson Education.
5. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured ProgrammingApproach Using C", Third edition, CENGAGE Learning, 2016.
6. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach withC", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition2011.
2. E. Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, UniversityPress.
4. M.T. Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.
5.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3							1		2		1	2
CO2	2	2									2		3	2
CO3	2	2											1	2
CO4	2	3		2							2		2	1
CO5	3	3		2							2		3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
I B. Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE (AI & ML))
I B. Tech II Semester (Common to CE, ME & ECE)

L	T	P	C
1	0	4	3

20AME01 - COMPUTER AIDED ENGINEERING DRAWING

THEORY:

UNIT I

Geometrical constructions – construction of polygons (inscribing, circumscribing), special methods– circle-tangents, Conics-ellipse, parabola, hyperbola -properties of conics, specialmethods of construction.

UNIT II

Projections of points – Projections of straight lines- lines inclined to both the principal planes,determination of true length, traces and true inclinations.

UNIT III

Projections of planes – inclined to both the principal planes.
Projection of regular solids – prisms, Pyramids, cylinders, tetrahedron and cones – axis inclined to oneplane.

UNIT IV

Sections of solids such as prisms, pyramids, cylinders, tetrahedron and cones (solids in simple position)– True shape of the section. Development of surfaces of simple solids, as above and part solids.

UNIT V

Principles of isometric projection – isometric scale – isometric projection of planes and solids – conversion of orthographic views into isometric views and vice- versa.

Practice:

1. **Geometrical constructions:**
   a. Sketching of polygons - Triangles, Square, Rectangle, Pentagon, Hexagon, Circle at different positions.
   b. Sketching of Tangents to the circles.
2. Conics:
   Constructions of Ellipse, Parabola, Hyperbola
3. **Points:**
   Drawing the quadrants and positioning of the points with reference to H.P and V.P with dimensions.
4. **Lines:**
   a) Sketching of lines when they are
      i. Parallel to both H.P & V.P
      ii. Parallel to V.P/H.P and perpendicular to H.P /V.P
      iii. Parallel to V.P/H.P and inclined to H.P /V.P
      iv. Inclined to both the planes
   b) Sketching of the line to measure true length & true inclinations
   c) Sketching of the line to determine the traces
5. Planes:
   Sketching of the planes when they are
   a) Perpendicular to V.P/H.P and parallel to H.P /V.P
   b) Inclined to V.P/H.P and perpendicular to H.P /V.P

c) Perpendicular to both V.P and H.P.
d) Inclined to both V.P and H.P.

6. Solids:

a) Sketching of 2D shapes and convert it to 3D solids (Prisms, Pyramids, cube, cylinder, one,tetrahedron)
b) Sketching of projections of solids when the position of axis is
   i. Perpendicular to V.P/H.P and parallel to H.P /V.P.
   ii. Inclined to V.P/H.P and parallel to H.P /V.P.
   iii. Parallel to both V.P and H.P.

7. Sections of solids:

a) Different types of hatching on the polygons.
b) Sketching of sections of solids when the section/cutting plane is
i. Parallel to V.P/H.P and perpendicular to H.P /V.P.
ii. Inclined to V.P/H.P and perpendicular to H.P /V.P.
iii. Perpendicular to both principal planes.
c) Sketching of sections when the cutting plane passing through different positions- base, axis, corner, apex/vertex, generator, lateral edge.
d) Sketching of true shapes.

8. Development of surfaces:

Sketching of developed surfaces of

a) cylinder, prisms using parallel line method
b) cone, pyramids using radial line method
c) truncated solids and frustum

9. Orthographic Projections:

Sketching of 2D views of front, top and side views of 3D objects.

10. Isometric projections:

a) Setting of isometric grid
b) Sketching of isometric views of 3D models / shapes.

TEXT BOOKS:

1. K. L. Narayana and S. Bheemanjaneyulu, Engineering Drawing with AutoCAD 2016, New Age Publishers, New Delhi, 2017.
2. Basant Agrawal and C.M.Agrawal, Engineering Drawing, Mc Graw Hill Education 2nd edition.

REFERENCE BOOKS:

1. K.Venugopal, Engineering Drawing and Graphics + AutoCad , New Age International (P) Ltd,Publishers, New Delhi, Fourth Edition
2. Siddiquee Arshad. N., Zahid A. Khan, Mukhtar Ahmad, Engineering Drawing: With primer on AUTOCAD, PHI Learning Pvt. Ltd.,

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
I B. Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

		L	T	P	C
20ACS02	**COMPUTATIONAL THINKING**	3	0	0	3

Course Outcomes:

At the end of the course the student will be able to:
1. Understand the computational thinking and moore's law.
2. Understand the Boolean logic and applications of propositional logic.
3. Learn actions and data organization.
4. Understand software correction, testing and performance measure using computer.

UNIT –I

Computer, computer science and computational thinking, From Abacus to machine, the first software, what make it a modern computer ,the first computer,moores law, **How Real world data becomes computable Data:** Information and data, converting information to data, Data capacity, Data types and Data Encoding, Data Compression, **Logic:** what is logic, Boolean logic-writing well-formed propositions, Evaluating propositions, Applications of propositional Logic

UNIT- II

Solving Problems: problem definition, Logic Reasoning, software design, other issues, Abstraction-Class diagram, use case diagram, **Algorithm thinking:** algorithm, software and programming language, Actions-Selection, Repetition, modularization.

UNIT- III

Modeling Solutions- Activity Diagrams, Selection in Activity Diagram, Repetition in Activity Diagram, states andstate diagrams, Including Behavior in state diagram, Data organization: Names, List-Arra22ys, linking, Graphs, And Hierarchies-organization charts, family tree, Biology, Linguistics, Trees.

UNIT- IV

von Neumann Architecture, Spread sheets-Spread sheet structure, Formulas/Expressions,, Text Processing-string basics, string operation, Patterns-how to write a pattern, Repetitions rules, character class rules

UNIT -V

Computer errors, software corrections, verification, software testing , white box testing ,black box testing, boundary value analysis **,** How is capacity measured in computer, an estimate of physical limitation , benchmarks, counting the performance, impractical algorithm ,impossible algorithms

Text Books:
1. Computational thinking for modern solver, David Riley and Kenny Hunt
Chapman &Hall/CRC, 2014

Reference Books:
1. How to solve it by Computer, R.G. Dromey, PHI, 2008

Mapping of CO's- PO's-PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	3												1	
CO3	1	2												3
CO4				2							2		2	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI&ML)
I B.Tech II Semester (Common to CE, ME & ECE)

L	T	P	C
0	0	3	1.5

20AHS07 ENGINEERING PHYSICS LAB

Course Outcomes:

After completion of practical, student will be able to

1. Explore the knowledge of Spectrometer and other optical instruments.
2. Apply concepts of magnetic materials, lasers, semiconductor, and it's their relative parameters.
3. Access, process and analyse scientific information of optical communication.

minimum of 10 experiments to be conducted during the academic year

1. Determine the wavelengths of given light source - Spectrometer.
2. Dispersive power of prism.
3. Determine the thickness of thin wire by Interference.
4. Determine the wavelength of given laser source - Diffraction grating.
5. Determine the radius of curvature of given piano convex lens by forming Newton Rings.
6. Magnetic field along the axis of a current carrying coll - Stewart and Gee's method.
7. Numerical Aperture of an optical fiber.
8. Bending losses In Optical Fiber.
9. Determine the wavelength of Laser source using optical fiber.
10. Determine Hall Coefficient and Carrier concentration of the given Semiconductor.
11. Determine the energy loss of ferromagnetic sample by plotting B-H curve.
12. Energy gap of a given semiconductor.
13. Solar Cell: To study the V-I Characteristics of solar cell.
14. Determine the particle size using laser source.

Mapping of CO's- PO's-PSO'

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	-	2	2
CO2	3	1	-	-	2	-	-	-	-	-	-	-	2	
CO3	2	-	-	-	-	-	-	-	-	-	-	-	1	2

3 High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

I B. Tech I Semester (Common to All Branches)

L	T	P	C
0	0	3	1.5

20ACS03 C-PROGRAMMING & DATA STRUCTURES LAB

Course Outcomes:

After completion of the course the student will be able to

1.Demonstrate basic concepts of C programming language.

2.Develop C programs using functions, arrays, structures and pointers.

3.Illustrate the concepts Stacks and Queues.

4.Design operations on Linked lists.

5.Develop searching and sorting methods.

Week l

a) Programs using I/O statements and expressions.

b) Programs using decision-making constructs.

Week 2

Write C programs that use both recursive and non-recursive functions

i)To find the factorial of a given integer.

ii)To solve Towers of Hanoi problem.

Week 3

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i)Addition of Two Matrices ii) Multiplication of Two Matrices

Week 4

Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to a given main string from a given position.

ii) Given a string ―a$bcd./fg‖ find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)

Week 5

From a given paragraph perform the following using built-in functions:

a.Find the total number of words.

b.Capitalize the first word of each sentence.

c.Replace a given word with another word.

Week 6

a) Write a C Program to perform various arithmetic operations on pointer variables.

b) Write a C Program to demonstrate the following parameter passing mechanisms:

i)call-by-value ii) call-by-reference

Week 7

Write C programs that implement stack (its operations) using

i)Arrays

ii)Pointers

Week 8

Write C programs that implement Queue (its operations) using

i)Arrays

ii)Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

i)Converting infix expression into postfix expression
ii)Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

i)Creation ii) Insertion iii) Deletion iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

i)Creating a Binary Tree of integers
ii)Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:
i)Linear search
ii)Binary search

Week 15

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

Week 16 (Case Study)

Create a ―Railway reservation system‖ with the following modules
i)Booking
ii) Availability checking
iii)Cancellation
iv)Prepare chart

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C",Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Mapping of CO's- PO's-PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3							1		2		1	
CO2	2	2												2
CO3	2	2											1	
CO4	3	3		2							2			1
CO5	3	3		2							2			2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI & ML))
I B.Tech II Semester (Common to CE, ME & ECE)

L	T	P	C
0	0	3	1.5

20AME02 ENGINEERING PRACTICE LAB

COURSE OUTCOMES:

After completion of the study of this lab a student will be able to:

CO1: Perform a different prototype model in the carpentry trade such as Mortise and tenon joint, andTable stand using woodturning lathe.

CO2: Prepare models such as Dove tail joint and Half Round joint using Fitting tools and rectangulartray, and funnel prototypes in the trade of Tin smithy.

CO3: Perform various basic House Wiring techniques such Staircase wiring (i.e. control of one lampby two switches fixed at two different places), and wiring for tube light (Fluorescent Lamp)/Focus light.

CO4: Fabricate different models in a foundry shop such as single- and two-pieces patterns andprototypes in the trade of Welding such as T-Joint and H-Joint.

1. TRADES FOR EXERCISES:

a. Carpentry shop

1. Prepare a Mortise and tenon joint from a given 300 x 40 x 25 mm soft wood stock.
2. Prepare a Table stand (desired shape) by using wood turning Lathe from a given300 x 40 x 25 mm soft wood stock.

b. Fitting shop

1. Prepare a Dove tail joint from a given 100 x 50 x 5 mm M.S. stock.
2. Prepare a Half Round joint from a given100 x 50 x 5 mm M.S. stock.

c. Sheet metal shop

1. Prepare a Funnel from given G.I. sheet.
2. Prepare a Rectangular Tray from given G.I. sheet.

d. House-wiring

1. Stair case wiring (i.e. control of one lamp by two switches fixed at two different places).
2. Prepare a wiring for tube light(“Fluorescent Lamp”)/Focus light

e. Foundry

1. Prepare a mould for a single piece pattern (Connecting rod)
2. Prepare a mould for a Double piece pattern (Stepped Pulley)

f. Welding

1. Prepare a T-Joint from given M.S Flat pates using Arc Welding.
2. Prepare a H-Joint from given M.S Flat pates using Arc Welding.

2. RADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop
c) Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCE BOOKS:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
2. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas
3. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.
4. Engineering Workshop by Vishnu Universal Learning.
5. Engineering Workshop by GRIE institute.

Mapping of CO's- PO's-PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS02
CO1		1	1	1		1	1	1	2	1	1	2		
CO2		1	1	1		1	1	1	2	1	1	2		1
CO3		1	1	1		1	1	1	2	1	1	1	2	
CO4		1	1	1		1	1	1	2	1	1	2	2	2
CO5		1	1	1		1	1	1	2	1	1	2	1	

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

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L	T	P	C
2	0	0	0

20AHS09 ENVIRONMENTAL SCIENCES
(Mandatory Course)

Course Outcomes:

After completion of practical, student will be able to

1. Understand what constitutes the environment, how to conserve the precious resources and maintain the ecological balance.
2. Aware of maintain the ecological balance based on the cultural and biological diversity can realize the importance of ecosystem, biodiversity and its conservation.
3. Identify the major pollutants and abatement devices in order to protect the environment from pollution for effective environmental management.
4. Manage social issues related to the environment and be aware of the enforcement of environment acts in our constitution.

UNIT I

ECO SYSTEMS AND BIODIVERSITY AND ITS CONSERVATION:

Definition, scope and importance, Need for public awareness. Concept of an ecosystem - Structure and function of an ecosystem.- Producers, consumers, decomposers - Energy flow in the eco systems - Ecological succession - Food chains, food webs and ecological pyramids -Introduction, types, characteristic features, structure and function of the following eco systems: - Forest ecosystem - Grass land ecosystem - Desert ecosystem - Aquatic eco systems (lakes, rivers, oceans) – Introduction - Definition: genetics, species and ecosystem diversity - Biogeographical classification of India. - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - India as a mega diversity nation - Hot-spots of biodiversity. - Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT II

NATURAL RESOURCES:

a) Forest resources- Use and over-exploitation – deforestation - case studies - Timber extraction – mining- dams and their effects on forests and tribal people. - Water resources - Use and over-utilization of surface and ground water - floods, drought - conflicts over water - dam’s benefits and problems. - Mineral Resources - Use and exploitation - environmental effects of extracting and using mineral resources -

case studies - Food Resources - World food problems - effects of modern agriculture - fertilizers-pesticides problems - Energy Resources - Growing energy needs- renewable and non- renewable energy sources, use of alternate energy sources - case studies.

b) Role of an individual in conservation of natural resources.

c) Equitable use of resources for sustainable life styles.

UNIT III

ENVIRONMENTAL POLLUTION:

Definition Causes, 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, earth quake, cyclone and landslides.

UNIT IV

SOCIAL ISSUES AND THE ENVIRONMENT:

Form unsustainable to sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, water shed management - Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - Wasteland reclamation - Consumerism and waste products - Environment protection Act - Air (prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Wildlife protection act - Forest conservation act - Issues involved in enforcement of environmental legislations - Public awareness. Visit to a local area to document environment assets river / forest / grassland / hill / mountain.

UNIT V

HUMAN POPULATION AND THE ENVIRONMENT:

Population growth and variation among nations - Population explosion- family welfare program - Environment and human health - Human rights - Value education - HIV / AIDS -Women and child welfare

- Role of information technology in environment and human health - Case studies. Visit to a local polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills lopes, etc

Text Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd

References Books:

1. Environmental Science G. Tyler Miller and Scottt Spoolman, Cengage Learning Publishers, 15lhEdition, 2015.
2. Environmental Encyclopedia Cunningham, W. P, Cooper T.H, Gorhani, Jaico publications,Mumbai, 2001.
3. Environmental Chemistry, B.K.Sharma, Krishna Prakashan Media (p) Ltd, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS02
CO1	3	-	-	-	-	-	-	-	1	-	-	-	2	
CO2	3	1	-	-	-	-	-	-	1	-	-	-	2	3
CO3	3	2	-	-	-	-	-	-	2	-	-	-	1	
CO4	2	2	-	-	-	-	-	-	2	1	-	-		2

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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I B. Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI & ML)

L T P C

3 0 0 3

20AHS01 COMMUNICATIVE ENGLISH

Course Outcomes:

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

CO1 Develop knowledge of basic grammatical concepts to understand asking and answering general questions on familiar topics and making paragraphs.

CO2 Interpret context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

CO3 Examine language aspects to do role plays, to study graphic elements and information transfer.

CO4 Demonstrate discourse markers to make effective oral presentations and to write structured essays.

UNIT I: EXPLORATION

LESSON: A proposal to Girdle the Earth, Nellie Bly.

LISTENING: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

SPEAKING: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

READING: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

READING FOR WRITING: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph

GRAMMAR AND VOCABULARY: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentence.

UNIT II: ON CAMPUS

LESSON: The District School as It Was by One Who Went It, Warren Burdon

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 followed by short structured talks.

READING: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

WRITING: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

GRAMMAR AND VOCABULARY: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT III: WORKING TOGETHER

LESSON: The Future of Work

LISTENING: Listening for global comprehension and summarizing.

SPEAKING: Discussing specific topics in pairs or small groups and reporting.

READING: Reading a text in detail by making basic inferences -recognizing and **i**nterpreting specific context clues; strategies to use text clues for comprehension.

WRITING: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetition

GRAMMAR AND VOCABULARY: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT IV: FABRIC OF CHANGE

LESSON: H.G. Wells and the Uncertainties of progress, Peter J. Bowler.
LISTENING: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

SPEAKING: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/direction.

READING: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

WRITING: Information transfer; describe, compare, contrast, identify significance/ trends based on information provided in figures/charts/graphs/tables.

GRAMMAR AND VOCABULARY: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

UNIT V: TOOLS FOR LIFE

LESSON: Leaves from the Mental Portfolio of a Eurasian, Sui San Far.

LISTENING: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

SPEAKING: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

READING: Reading for comprehension.

WRITING: Writing structured essays on specific topics using suitable claims and evidences

GRAMMAR AND VOCABULARY: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Text Books

1. English all round: Communication Skills for under graduation LearnersVol. I,Orient Black Swan Publishers, First Edition2019.

Reference Books

1. Academic writing: A handbook for international students, Bailey, Stephen, Routledge.2014.
2. Pathways: Listening, Speaking and Critical Thinking Chase. BeckyTarver, HeinleyELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) MacmillanEducational

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	3	-	-	3	2
CO2	2	2	-	-	-	-	-	-	-	3	-	-	2	
CO3	3	3	-	-	-	-	-	-	-	3	-	-		3
CO4	3	-	-	-	-	-	-	-	3	3	-	-	3	1

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME & ECE)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	0	0	3

20AHS03 ENGINEERING CHEMISTRY

Course Outcomes:

After completion of the course students will be able to

1. Understand the impact of hard water and its removal, apply the concept of estimation of hardness.
2. Analyse the selection of suitable engineering materials for specific applications.
3. Understand the Effect of corrosion and to know the designing of corrosion resistant articles.
4. Apply suitable fuels based on analysis of coal, calorific value for a particular application, calculation of air requirements for combustion of fuel, types of various batteries.

UNIT – I

WATER TECHNOLOGY: Sources of water - impurities in water - Hardness of Water and its unit of expression - Estimation of hardness in water by EDTA titration method - Numerical problems - Boiler troubles and prevention methods - Estimation of Dissolved Oxygen in water by Winkler's method - specifications for drinking water Bureau of Indian Standards(BIS) and World health organization(WHO) standards - Water softening methods by Internal conditioning and External conditioning methods - Chlorination Of Domestic Water Treatment - Desalination of Brackish Water by Reverse Osmosis and electro dialysis methods.

UNIT – II

MATERIALS CHEMISTRY: High Polymers: Polymers – Definition - Nomenclature of polymers - Types of polymerization reactions addition, condensation and copolymerization with examples. Plastics: Thermoplastics and thermosetting plastics and differences between them - Preparation, Properties and Engineering applications of PE, PTFE, PVC, Nylon and Bakelite. Conducting polymers - polyacetylene, polyaniline, polypyrroles - mechanism of conduction and applications. **Rubbers:** Natural Rubbers – Vulcanization - Synthetic Rubbers (Buna-S, Silicone Rubber, Neoprene) preparation, properties and applications. **Lubricants:** Functions of Lubricants - Classification of Lubricants - various properties of Lubricants (Viscosity, Viscosity Index, Flash and fire point, Cloud and pour point, Aniline point, Acid value or Neutralization number. **Refractories**: Important properties of refractories (Refractoriness, Refractoriness under Load, Porosity, Thermal spalling) and their applications.

UNIT – III

CHEMISTRY OF CORROSION: Introduction on corrosion - causes and consequences of corrosion - Types of corrosion - Dry, Wet, Galvanic, Differential Corrosion - Mechanism of Dry and Wet corrosion - Factors influencing the corrosion - Control of corrosion - Cathodic protection by Sacrificial anodic and Impressed current cathodic protection - Electro Plating and Electroless plating (Copper and Nickel).

UNIT – IV

FUELS AND COMBUSTION: Fuels, Classification of Solid, Liquid and Gaseous fuels - Analysis of coal - Proximate and Ultimate analysis - Refining of Petroleum - Preparation of syntheticpetrol - Bergius process - knocking and anti-knock agents - Octane and Cetane values - Calorific value - HCV, LCV - Numerical problems using Dulong-Petit's formula - Measurement of calorific value using Bomb calorimeter and Junkers gas calorimeter - Numerical problems.

Combustion: Calculation of air quantity requirement for Combustion - Numerical problems.

UNIT–V

ELECTROCHEMICAL ENERGY SYSTEMS: Electrochemical Cells - Electrode potential - Standard electrode potential - Nernst equation - cell potential calculations - Basic concepts of pHmetry, Potentiometry and Conductometric Titrations - Working principles and applications of different batteries - Dry cell, Lithium-ion cell, Lead-acid cell and Nickel-cadmium cell with discharging and recharging reactions - Working principles and applications of hydrogen-oxygen fuel cell, methanol-oxygen fuel cell.

Text Books:

1. A text book of Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company, 15th edition, New Delhi, 2008.
2. Chemistry for Engineers, Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C.Ramachandraiah, McGraw Hill Higher Education Hyd., 3rd edition, 2009.

Reference Books:

1. Engineering Chemistry, Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra,Scitech Publications (India) Pvt. Limited, Hyderabad, 2009.
2. A text book of Engineering Chemistry, Dr. K. RaviKrishnan, Sri Krishna Publications,Secunderabad, Telangana, New edition. July, 2015.
3. Chemistry of Engineering Materials, C.V. Agarwal, C. Parameswara Murthy and AndraNaidu, BS Publications, Hyderabad, 9th edition, 2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	3	2	
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1		2
CO3	3	2	-	-	-	-	-	-	-	-	-	-		1	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-		2	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech II Semester (Common to All Branches)

L	T	P	C
3	1	0	3

20AHS08 ALGEBRA AND TRANSFORMATION TECHNIQUES

Course Outcomes:

After completion of the course the student will be able to

1. Solving system of linear equations and determine the Eigen values and Eigen vectors.
2. Apply the knowledge of Laplace and Fourier transform Techniques in solving differential equations.
3. Apply Fourier series to expand given functions.
4. Analyze the principles of Z-transforms for solving the difference equation.

UNIT-I

MATRICES: Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors. Cayley- Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem. Diagonalization of a matrix.

UNIT-II

LAPLACE TRANSFORMS: Laplace transforms of standard functions - First Shifting Theorem -Transforms of derivatives and integrals- Unit step Function – Second Shifting Theorem –Laplace transforms of Periodic functions – Inverse Laplace transforms - Convolution theorem. Applications of Laplace Transforms to ODE

UNIT-III

FOURIER SERIES: Determination of Fourier coefficients- Fourier series- Even and odd functions -Fourier series in an arbitrary interval -Half-range Fourier sine and cosine expansions.

UNIT-IV

FOURIER TRANSFORMS: Fourier integral theorem (only statement) - Fourier sine and cosine integrals. Fourier Transforms - Fourier sine and cosine Transforms – properties –Inverse transforms – Infinite Fourier transforms.

UNIT-V

Z-TRANSFORMS: Standard functions **-** Properties - Damping rule- Shifting rule - Initial and final value theorems. Inverse Z- transforms - Convolution theorem - Solution of difference equations by Z- transforms.

Text Books:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, 44/e Kanna Publications, 2017.
2. A Text book of Engineering Mathematics –II, T. K. V. Iyengar, B. Krishna Gandhi and others, S. Chand and company. 8th Revised edition, 2013.

Reference Books:

1. A Text Book of Engineering Mathematics-I, B.V. Ramana, , Tata Mc Grawhill
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons-2016.
3. Introductory Methods of Numerical Analysis S.S. Sastry, Printice Hall of India publications, 2012.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	3
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	2

3- High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

L	T	P	C
3	1	-	3

I B. Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML)

20AEE05 BASIC ELECTRICAL ENGINEERING

Course Outcomes:

After completion of this course the students will be able to:

1. Evaluate the electrical circuits and networks parameters
2. Emphasis the RLC Design models
3. Acquire the concept of all types of Electrical DC Machines and AC Machines
4. To know the concept of all types of Electrical systems

UNIT I: DC CIRCUITS & AC CIRCUITS

DC Circuits:

Electrical circuit elements (R - L and C) – Kirchhoff's laws -Voltage and Current division rules series, parallel circuits and star-delta and delta-star transformations

AC Circuits:

Generation of sinusoidal voltage, Representation of sinusoidal waveforms - Peak and RMS values - phasor representation – real power - reactive power - apparent power -, energy and power factor.

UNIT II: DC MACHINES

DC Generator:

Construction-Principle and operation of DC Generator - EMF equation -Types– Applications

DC Motor:

Principle and operation of DC Motor – types-Torque equation - Speed control of DC Motor-
Brake test- Swinburne's test-Applications.

UNIT III: AC MACHINES I

Transformers: Construction and working of a single-phase transformer, EMF Equation; Construction andworking of three phase Induction motor, torque equation, torque-slip characteristics, Applications;

UNIT IV: AC MACHINES II

Construction and working of synchronous machines, Applications. Construction and working of Stepper, Universal motor, Brushless DC Motor. Resistor start, capacitor start and run single phase induction motors, Applications

UNIT V: PRINCIPLES OF ELECTRICAL SYSTEMS

Fuse, circuit breaker (MCB, MCCB, RCCB, ELCB), relay (elementary treatment); Inverter and UPS (block diagram approach only). Earthing – importance of earthing, pipe earthing and plate earthing; Safety measures. Energy Efficiency (Starrating) standards by BEE.

Text books:

1. V.K.Mehta & Rohit Mehta, Principles of Electrical Engineering, S.Chand publications
2. D.P. Kothari and I.J. Nagarath –"Basic Electrical & Electronics Engineering", Mc.Grawhill publications
3. Ashfaq Hussain, Fundamentals of Electrical Engineering, Dhanpatrai & Co. (P)Ltd., 3rd edition, New Delhi, 2009.

Reference Books:

1. Cotton, Electrical Technology, CBS Publishers & Distributors, 2004.
2. T.K.Naga sarkar, M.S.Sukhija, Basic Electrical Engineering, Oxford University press New Delhi, 2010
3. M.S. Naidu, S. Kamakshaiah, Introduction to Electrical Engineering, Tata McGraw-Hill Education, New Delhi, 2007.

Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS02
CO1	1	2			3			1			1		1	
CO2	1	2			3			1						
CO3	1				2			1						
CO4	1	1			1			2			1			2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech II Semester (Common to all branches)

L	T	P	C
3	1	-	3

20ACS04 PROBLEM SOLVING AND PROGRAMMING USING PYTHON

Course Outcomes:

After Completion of the course the student will be able to

1. Demonstrate knowledge in Basics of python programming
2. Use the data structure lists, Dictionaries and Tuples.
3. Solve the problems by applying the modularity principle.
4. Demonstrate knowledge in OOP.
5. Demonstrate various mathematical operations using NumPy, Analyze Data using Pandas and visualizations using Matplotlib.

UNIT- I

INTRODUCTION TO PROBLEM SOLVING, EXPRESSION AND DATA TYPES

Fundamentals: what is computer science - Computer Algorithms - Computer Hardware - Computer software - Computational problem solving the Python programming language - Overview of Python, Environmental Setup, First program in Python, Python I/O Statement. **Expressions and Data Types:** Literals, Identifiers and Variables, Operators, Expressions. Data types, Numbers, Type Conversion, Random Number.

Problem solving: Restaurant Tab calculation and Age in seconds.

UNIT- II

CONTROL STRUCTURES& COLLECTIONS

Control Structures: Boolean expressions, Selection control and Iterative control. **Arrays -** Creation, Behavior of Arrays, Operations on Arrays, Built-In Methods of Arrays.**List** –Creation, Behavior of Lists, Operations on Lists, Built-In Methods of Lists. **Tuple** -Creation, Behavior of Tuples, Operations on Tuples, Built-In Methods of Tuples. **Dictionary** – Creation, Behavior of Dictionary, Operations on Dictionary, Built-In Methods of Dictionary. **Sets** – Creation, Behavior of Sets, Operations on Sets, Built-In Methods of Sets, Frozen set.

Problem Solving: A Food Co-op’s Worker Scheduling Simulation.

UNIT- III

STRINGS, FUNCTIONS AND FILES

Strings - String Literal, Assigning String to a variable, Multiline Strings, String Slicing, Built-in Functions and Methods. **Functions** – Creating functions, calling a function, passing arguments to functions, function with return statement, Recursive function, Lambda Function**.** **Files** – File Handling, Create, Write, Read and Delete Files

UNIT-IV

OBJECT ORIENTED PROGRAMMING AND EXCEPTIONS

OOP - Classes and Objects, Encapsulation, Inheritance, Polymorphism, Constructor and Destructor, Self parameter, Local and Global Scope, Access Modifiers, Polymorphism, super() method. Modules in python. **Exceptions** – Handling Exceptions, Raising Exceptions, Exception Chaining, User Defined Exceptions.

Problem solving: Credit card calculation.

UNIT- V

INTRODUCTION TO NUMPY, PANDAS, MATPLOTLIB: Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps, etc.

Text Books:

1. Introduction to Computer Science using Python: A Computational Problem-Solving Focus, First Edition,Charles Dierbach, Wiley India , 2012.
2. Programming Python,Mark Lutz, O'Reilly Publications, Fourth Edition, 2011.

Reference Books:

1. Core Python Programming, 2 nd edition,R. Nageswara Rao, Dreamtech Press, 2018.
2. Fundamentals of Python,, Third Edition,Kenneth Lambert and B.L. Juneja,Cengage Learning, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3							1		2		1		2
CO2	2	2												2	
CO3	2	2											1		2
CO4	3	3		2							2			1	2
CO5	3	3		2							2			2	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to CE,ME & ECE)

I B.Tech II Semester (Common to EEE,CSE, IT, CSE(DS)&CSE(AI &ML))

L	T	P	C
0	0	3	1.5

20AHS05 COMMUNICATIVE ENGLISH LAB

Course Outcomes:

After completion of the course students will be able to

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Develop communication skills through debates, oral presentations, group discussions and various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and reading comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.

UNIT I

1. Phonetics for listening comprehension of various accents.
2. Reading comprehension
3. Describing objects/places/persons

UNIT II

1. JAM
2. Small talks on general topics
3. Debates

UNIT III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Group Discussion

UNIT IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

UNIT V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

PRESCRIBED SOFTWARE FOR PRACTICE:

Sky Pronunciation, Pro-power 2 & Globarena

Reference Books

1. Academic writing: A handbook for international students, Bailey, Stephen, Routledge,2014.
2. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
3. Cambridge Academic English (B2), Hewings, Martin. 2012.
4. Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011
5. Technical Communication by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U Press 2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	3	-	-	2	1
CO2	3	3	-	-	-	-	-	-	3	3	-	-	1	2
CO3	2	2	-	-	-	-	-	-	-	3	-	2	2	
CO4	3	-	-	-	-	-	-	-	-	3	-	2		3

3- High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech – II Semester (Common to all Branches)

L	T	P	C
0	0	3	1.5

20ACS05 PROBLEM SOLVING AND PROGRAMMING USING PYTHON LAB

Course Outcomes:

After Completion of the course the student will be able to

1. Write, Test and Debug Python Programs
2. Implement Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists, Tuples and Dictionaries
4. Read and write data from & to files in Python

WEEK 1

a. Write a python script to display a simple message

b. Write a python script to perform basic arithmetic operations on two values which are accepted from the user.

WEEK 2

a. Write a python script to calculate the factorial of a given number.

b. Write a python script to calculate sum of individual digits of a given number.

c. Write a Python program that prompts the user for two floating-point values and displays the result of the first number divided by the second with exactly six decimal places displayed.

WEEK 3

a. Write a python script to find the largest number among three numbers and display them in ascending order using if-else construct.

b. Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-while loop constructs.

c. Write a python script to display the prime number series up to the given N Value.

WEEK 4

a. Write a Python program

i. To calculate sum all the items in a list.

ii . To remove duplicates from a list.

iii. To find the list of words that are longer than n from a given list of words.

iv. To get the difference between the two lists.

v. To append a list to the second list.

b.Write a Python program to print a specified list after removing the 0^{th}, 4^{th} and 5^{th} elements.

Sample List : ['Red', 'Green', 'White', 'Black', 'Pink', 'Yellow']

Expected Output : ['Green', 'White', 'Black']

c.Write a python script to arrange the given list of elements in ascending or descending order.

WEEK 5

a. To write a python program to create, slice, change, delete and index elements using Tuple.

b. Write a Python program to replace last value of tuples in a list.

Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]

Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]

WEEK 6

a. Write a program to demonstrate working with dictionaries in Python

WEEK 7

a. Write a Python program

i. To create a set.

ii. To remove item(s) from a set.

iii. To remove an item from a set if it is present in the set.

iv. To create a union and intersection of sets.

v. To create set difference.

WEEK 8

a. Write a python script to demonstrate string methods.

b. Write a Python program to count the number of characters (character frequency) in a string.

Sample String: google.com'

Expected Result : {'g': 2, 'o': 3, 'l': 1, 'e': 1, '.': 1, 'c': 1, 'm': 1}

c. Write a Python program to reverse a string.

Sample String : "1234abcd"

Expected Output : "dcba4321"

d. Write a Python script that takes input from the user and displays that input back in upper and lower cases.

e. Write a Python script to get a string made of 4 copies of the last two characters of a specified string (length must be at least 2).

Sample Input /Output

Input: Python – Output: onononon

Input: Exercises – Output: eseseses

f. Write a Python function that checks whether a passed string is palindrome or not.

WEEK 9

a. Write a python script to find GCD of two numbers using recursive and non recursive functions.

b. Write a python script to convert the following using functions:

i. Fahrenheit to Celsius temperature.
ii. Celsius to Fahrenheit temperature.

WEEK 10

a. Write a python script to demonstrate the Exception Handling.

WEEK 11

a. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order

b. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.

WEEK 12

a. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.

b. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.

WEEK 13

a. Write a python script to implement inheritance.

b. Write a python script to implement constructor.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3							2		3		1	
CO2	2	2												2
CO3	2	2											2	
CO4	2	2												2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING ANDTECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME &ECE)

I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
0	0	3	1.5

20AHS06 ENGINEERING CHEMISTRY LAB

Course Outcomes:

After completion of practical, student will be able to

1. Estimate the amount of metal ions, hardness of water, chlorides in water, acidity, alkalinity, dissolved oxygen in water by using volumetric analysis.
2. Demonstrate the importance of viscosity index, flash point and fire point of lubricants and to prepare a polymer.
3. Apply pH meter, conductivity meter and potentiometer to find the normality and amounts of substances in solution

Any **TEN** of the following experiments

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Chlorides in Water sample.
3. Determination of acid strength by using a pH meter (I) Strong acid VS Strong base (II) Weak acid Vs Strong base.
4. Estimation of Copper using EDTA by complexometric method.
5. Determination of effect of temperature on absolute and kinematic viscosity of oils throughRedwood viscometer No.1.
6. Estimation of Ferrous Ion by Potentiometry using standard Potassium Dichromate in a Redox reaction.
7. Determination of rate of corrosion by weight loss method.
8. Determination of acid strength by Conductometric method – Strong acid VS Strong base.
9. Determination of Alkalinity of water sample.
10. Determination of Acidity of water sample.
11. Estimation of Dissolved Oxygen in water by Winkler's method.
12. Estimation of Ferrous Ion by Potassium Dichromate method.
13. Determination of Flash and Fire point by using Pensky Marten's apparatus.
14. Preparation of Phenol-Formaldehyde resin.
15. Determination of moisture content in a coal sample

Text Books:

1. Chemistry pre-lab manual by Dr K. N. Jayaveera and K.B. Chandra Sekhar,

S.M.EnterprisesLtd., 2007.

2. Vogel'S text book of Quantitative Inorganic Analysis, ELBS Edition, 1994.

Equipment Required:

1. Glassware: Burettes, Pipettes, Standard Flasks, Beakers, Measuring jars, BOD bottlesand Reagent bottles.
2. Analytical balance,
3. Pensky Marten's apparatus
4. Redwood viscometer,
5. Conductometer,
6. Potentiometer.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CO3	3	3	-	-	-	-	-	-	-	-	-	-		2

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech I Semester (Common to CE, ME & ECE)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI &ML))

L	T	P	C
2	-	-	-

20AMB01 **DESIGN THINKING**
(Mandatory Course)

Course Outcomes:

After completion of the course the student will be able to
1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
3. Develop innovative products or services for a customer base using ideation techniques.
4. Build prototypes for complex problems using gathered user requirements.
5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

UNIT I: INTRODUCTION TO DESIGN THINKING

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

UNIT II: EMPATHIZE

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

UNIT III: IDEATION

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

UNIT IV: PROTOTYPING

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

UNIT V: TESTING PROTOTYPES

Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

Text Books:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, “Introduction to Design Thinking”,Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy, “Prototyping for Designers: Developing the best Digital and Physical Products”, O’Reilly, 2017.

Reference Books:

1. Michael G. Luchs, Scott Swan , Abbie Griffin,”Design Thinking – New Product Essentials from PDMA”, Wiley, 2015.
2. Vijay Kumar, “101 Design Methods: A Structured Approach for Driving Innovation in Your Organization”, 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we
4. https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves-the-status-quo
5. https://hbr.org/2018/09/why-design-thinking-works
6. https://hbr.org/2015/09/design-thinking-comes-of-age
7. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
8. https://nptel.ac.in/courses/109/104/109104109/
9. https://nptel.ac.in/courses/110106124/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		3	2									1	
CO2	1	3												2
CO3	1			3	1									
CO4		3		3									1	
CO5					1	2	3							3
CO6	1	3	1				1	1						

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B. Tech-I Semester (Common to All Branches)

L	T	P	C
3	1	0	3

20AHS10 NUMERICAL METHODS

Course Outcomes:

After completion of the course the student will be able to

1. Classify the algebraic and non algebraic equations and solve them using different iterative methods.
2. Apply numerical techniques to solve engineering problems.
3. Interpret the data and drawing the valid conclusion.
4. Evaluate the numerical solutions of ordinary differential equations using single step and multistepmethods.
5. Solve real world problems using solutions of partial differential equations.

UNIT-I

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Introduction–Inter mediate value theorem-The Bisection method-The method of false position Newton - Raphson method-Iteration Method - Problems on Iterative methods. Interpolation: Forward Differences - backward differences-Newton's forward and backward differences formulae for interpolation –Problems on Interpolation - Lagrange's interpolation formula-Inverse interpolation-Problems.

UNIT-II

NUMERICAL DIFFERENTIATION AND INTEGRATION

Approximation of derivatives using interpolation polynomials-First and second order derivatives-Problems on numerical differentiation. Newton Cotes formulae – Numerica lintegration using Trapezoidalrule, Simpson's 1/3 rule and Simpson's 3/8th Rule.

UNIT-III

CURVE FITTING:

Fitting of Curves by method of Least - squares – Fitting of Straight lines – Fitting of second degree Parabola-Fitting of the exponential curve- Fitting of the power curve – Problems –Regression-Correlation–Problems on interpretation of data–Drawing conclusions.

UNIT-IV

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS Taylor's series-Picard's method of successive Approximations -Euler's and Modified Euler's Method-Problems onsingle step methods– Runge – Kutta Methods – Predictor – corrector method-Milne's method.

UNIT-IV

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables - Solution of one dimensional wave equation, heat equation and two– dimensional Laplace'sequation.

TextBooks:

1. Dr.B.S.GREWAL, Higher Engineering Mathematics. Kanna Publications, 42^{th} edition.
2. B.V.Ramana, AText Book of Engineering Mathematics-I,TATAMCGRAWHILL
3. E.Rukmangadachari and KeshavaReddy, A Text Book of Engineering Mathematics-I, PEARSON EDUCATION.
4. T.K.V.Iyengar,B.Krishna Gandhi and Others, A Text Book of Engineering Mathematics–I, S. Chand and Company.

References:

1. Erwin Kreyszig, Advanced EngineeringMathematics.JOHNWILEY&SONS-2016.
2. Jain.M.K, Iyengar T..K.V, Jain.R.K. Numerical Methods For Scientific And Engineering Computation. New age International Publishers.
3. N.Bail, M.Goyal &C.Walking, A Text Book of Advanced Engineering Mathematics-AComputerApproach.
4. Pal, Mathematical Methods, Oxford University Press, 2009.
5. S.S.Sastry,Introductory Methods of Numerical Analysis,Printice Hallof India publications, 2011

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

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	-	3

20ACS06 - COMPUTER ORGANIZATION AND ARCHITECTURE

Course Outcomes:

After Completion of the course the student will be able to:

1. Recognize the functionalities of computer architecture and its components.
2. Apply various basic algorithms and operations to solve complex arithmetic problems complying with IEEE standards.
3. Apply the concepts of memory management for analysis of system performance.
4. Identify the I/O components of computer architecture and their performance.
5. Describe pipelining mechanisms and recognize different parallel machine models.

UNIT I **7 hrs**

Introduction to computer systems - Overview of Organization and Architecture -Functional components of a computer -Registers and register files-Interconnection of components-Organization of the von Neumann machine and Harvard architecture-Performance of processor. Data representation, fixed and floating point and error detecting codes.

UNIT II **8 hrs**

Fundamentals of Computer Architecture: Introduction to ISA (Instruction Set Architecture)-Instruction formats- Instruction types and addressing modes- Instruction execution (Phases of instruction cycle)- Assembly language programming-Subroutine call and return mechanisms-Single cycle Data path design-Introduction to multi cycle data path-Multi cycle Instruction execution. Arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit.

UNIT III **8 hrs**

Micro programmed Control: Control memory, address sequencing, micro program example, and design of control unit. Computer Arithmetic: Fixed point representation of numbers-algorithms for arithmetic operations: multiplication (Booths, Modified Booths) - division (restoring and non-restoring) - Floating point representation with IEEE standards and algorithms for common arithmetic operations- Representation of non-numeric data (character codes).

UNIT IV **9 hrs**

THE MEMORY SYSTEM: Memory systems hierarchy-Main memory organization-Types of Main memory-memory inter- leaving and its characteristics and performance- Cache memories: address mapping-line size- replacement and policies- coherence- Virtual memory systems- TLB- Reliability of memory systems- error detecting and error correcting systems.

INPUT/OUTPUT ORGANIZATION: I/O fundamentals: handshaking, buffering-I/O techniques: programmed I/O, interrupt-driven I/O, DMA- Interrupt structures: vectored and prioritized-interrupt overhead- Buses: Synchronous and asynchronous- Arbitration.

UNIT V **8 hrs**

Device Subsystems: Externa lst- RAID Levels- I/O Performance. Performance Enhancements: Classification of models - Flynn's taxonomy of parallel machine models (SISD, SIMD, MISD,MIMD)- Introduction to Pipelining- Pipelined data path-Introduction to hazards. Contemporary issues: Recent Trends: Multiprocessor architecture: Overview of Shared Memory architecture, Distributed architecture.

Text Books:

1. M. Morris Mano, Computer System Architecture, 3rdedition,PHI,India, 2006.
2. Carl Hamacher, ZvonksVranesic, SafeaZaky, Computer Organization, 5th edition, McGraw Hill, New Delhi,India,2010.

Reference Books:

1. William Stallings, Computer Organization and Architecture, designing for performance, 8 th edition, Prentice Hall, NewJersy, 2010.
2. Andrew S. Tanenbaum, Structured Computer Organization, 5th edition, Pearson Education Inc, NewJersy, 2006.
3. Sivarama P. Dandamudi, Fundamentals of Computer Organization and Design, Springer Int. Edition, USA, 2003.

CO-PO's mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	2	3		3				3					3	
CO3	2	3											3	
CO4	3													
CO5	3													

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))
III B. Tech I Semester EEE, ECE (Open Elective-I)

L	T	P	C
3	-	-	3

20ACS07 - OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes:

After Completion of the course the student will be able to:

1. Demonstrate basic principles of OOP in java programming.
2. Apply the concepts of inheritance packages and interfaces in code reusability.
3. Apply the principles of exception handling in designing the customized exception to handle errors in application software.
4. Apply concepts of multithreading to solve problems in parallelism.
5. Apply concepts of Enumeration and Collections Framework in solving real time problems

UNIT-I **9 hrs**

Java History, Java Features, Object Oriented Features, Tokens-Constants, Identifiers, Keywords, Operators. Data types, type conversions, Statements-Expression, selection, Loop, Jump, Label and block statements. Arrays-one dimensional, two dimensional, String class, StringBuffer class, String Builder.

UNIT –II **8 hrs**

Fundamentals, declaring objects, object references, Methods, Constructors-default, parameterized constructors, garbage collection, this keyword. Method Overloading, constructor overloading, static, nested and inner classes, command-line arguments.

Inheritance- Basics, Creating multilevel hierarchy, using super, method overriding, dynamic method dispatch, abstract classes, using final in inheritance.

UNIT-III **6 hrs**

Packages-definition, class path, Access protection, importing packages.

Interfaces- definition, implementing interfaces, nested interfaces, variables and methods in interfaces, recent advances in interfaces, multiple inheritance using interfaces.

UNIT- IV **9hrs**

Exception Handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, chained exceptions, custom exceptions.

Multithreading: Thread life cycle, Java Thread Model, Main thread, creation of child thread, creation of multiple child threads, isAlive(),join(), wait(),notify(),notifyAll(), synchronization, inter thread communication.

UNIT- V **9 hrs**

Enumerations, Wrapper classes, auto boxing, annotations.

Lambda expressions-introduction, Block lambda expressions, Generic functional interfaces, passing lambda expressions as arguments, lambda expressions and exceptions, lambda expressions and variable capture. Collections Framework: Collection interfaces and classes. Iterators, split Iterators, Map, comparators, Arrays, String tokenizer, Bitsets, Random, Scanner class.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, and University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson, Cengage Learning.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3											3	
CO3	2	3	3	3									3	
CO4	3	3		3										3
CO5	2	3		3										2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, & CSE (AI &ML))
III B.Tech I Semester (CSE (DS)- Professional Elective-I)

L	T	P	C
3	-	-	3

20AIT01 - AUTOMATA AND COMPILER DESIGN

Course Outcomes:

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

1. Demonstrate knowledge to represent the different programming language constructs (keywords, expressions, statement) in the machine understandable language by using the basic tools (REs, Automata) of automata theory.
2. Analyze various intermediate forms of source programs.
3. Apply the code optimization techniques in the generation of code for a given real time problem.

UNIT-I

COMPILER, FORMAL LANGUAGE, REGULAR EXPRESSIONS:

Introduction, Phases of Compiler, Specification of Token, Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA, Conversion of regular expression to NFA, NFA to DFA.

UNIT-II

CONTEXT FREE GRAMMARS AND GRAMMAR PARSING:

Context free grammars, derivation, parse trees, ambiguity LL (K) grammars and LL (1) parsing. Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

UNIT-III

SEMANTICS, RUN TIME STORAGE MANAGEMENT:

Syntax directed translation, S-attributed and L-attributed grammars, Chomsky hierarchy of languages and recognizers, Type checking, type conversions, equivalence of type expressions, overloading of functions and operations. Storage organization, storage allocation strategies, scope access to non-local names, parameter passing, and language facilities for dynamics storage allocation.

UNIT-IV

INTERMEDIATE CODE GENERATION

Intermediate code – abstract syntax tree, translation of simple statements and control flow statements, Back patching, procedure calls.

UNIT-V

CODE OPTIMIZATION AND CODE GENERATION:

Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs. Machine dependent code generation, Issues in the design of code generation, object code forms, generic code generation algorithm, Register allocation and assignment. DAG representation of Basic Blocks.

Text Books:

1. Compilers Principles, Techniques and Tools, Alfred V.Aho and Jeffrey D.Ullman, Ravi sethi, Pearson Education.

Reference Books:

1. Modern Compiler Construction in C, Andrew W. Appel., Cambridge University Press.
2. Theory of Computation, S. Balakrishnan and V.D. Ambeth Kumar, ACME Learning Publisher, New Delhi.
3. Principles of Compiler Design 3rd Edition, Balakrishnan S, Sai Publishers.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1									2	1	2
CO2	3	2	3										3	
CO3	2		2									2	1	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))
III B.Tech II Semester EEE, ECE (Open Elective-II)

L	T	P	C
3	-	-	3

20ACS08 - RELATIONAL DATABASE MANAGEMENT SYSTEMS

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

1. Demonstrate the basic elements of a relational database management system.
2. Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries.
3. Apply the concepts of ER-modelling and normalization to design practical data models
4. Analyze transaction processing, concurrency control and storage methods for database management.

UNIT –I **8 hrs**

Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.

UNIT-II **9 hrs**

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

UNIT-III **9 hrs**

SQL: Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV **9 hrs**

Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms.

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

UNIT-V **8 hrs**

Indexing And Hashing: File Organization, Organization of Records in Files, Ordered Indices, B+ Tree Index Files, B,Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, 2017, Pearson.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.

Reference Books:

1. Ivan Bayross,”SQL, PL/SQL programming language of Oracle”, BPB Publications 4th edition, 2010.
2. Raghurama Krishnan, Johannes Gehrke, “Data base Management Systems”, TATA McGraw,Hill 3rd Edition,2007.
3. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

4. S.K.Singh, “Database Systems Concepts, Design and Applications”, First edition, Pearson Education, 2006.

CO-PO’s Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3	
CO2	3	2	3		3								3	
CO3	2	2	3										3	2
CO4	3	3											3	

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACS09 – OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Outcomes:
At the end of the course the student will be able to:
1. Apply syntactic constructs of JAVA to solve engineering problems.
2. Solve real time problems using interfaces, packages, Exception Handling, Collection Framework and Multithreading.
3. Work independently and in team to solve competitive problems.

Week-1:
Write a Java program that prints all real solutions to the quadratic equation ax2+ bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

The Fibonacci sequence is defined by the following rule: The fir two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses recursive functions to print the nth value in the Fibonacci sequence

Write a Java program that uses non-recursive functions to print the nth value in the Fibonacci sequence

Week-2:
a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. util)

Week-3:
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. c) Write a Java program to make frequency count of words in a given text.

Week-4:

a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file.

Week-5:

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.

Week 6

a) Write a java program to create an abstract class named Shape that contains an empty method named number of Sides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains.

Week 7

a) Write a java program to implement interface using lambda expressions.

b) Write a Java Program to implement comparator using lambda expressions.

c) Write a Java Program to illustrate the iteration of enumeration elements.

Week 8

Create an enumeration called Players that have some names and runs scored. Create a constructor and a method that will return the number of runs scored by each player or enumerator or enum constant. Using values () method to iterate the enumerator and display the number of runs scored by each player.

Week 9

In a given string, find the first non-repeating character .You are given a string, that can contain repeating characters. Your task is to return the first character in this string that does not repeat. i.e., occurs exactly once. The string will contain characters only from English alphabet set, i.e., ('A' - 'Z') and ('a' - 'z'). If there is no non-repeating character print the first character of string.

Week 10

Practice sessions on HackerRank and HackerEarth

Example: HackerEarth –jumble letter, missing alphabets

HackerRank -bear and steady gene, super reduced string, gemstones

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3									3	
CO2	3	3	3	3									3	
CO3	3	3	3	3					3			3		

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20AIT02 - AUTOMATA AND COMPILER DESIGN LAB

Course Outcomes:

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

1. Define the role of lexical analyzer, use of regular expressions and transition diagrams.
2. Analyze the working of lex and yacc compiler for debugging of programs.
3. Demonstrate the working of compiler at various stages
4. Demonstrate the working nature of compiler tools.

List of Experiments:

1. Write a C Program to implement NFAs that recognize identifiers, constants, and operators of the mini language.
2. Write a C Program to implement DFAs that recognize identifiers, constants, and operators of the mini language.
3. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
4. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools.
5. Recognition of a valid variable which starts with a letter and followed by any number of letters or Digits.
6. Design Predictive parser for the given language.
7. Design LALR bottom up parser for the given language.
8. Implementation of the symbol table.
9. Implementation of type checking.
10. Implementation of Dynamic Memory Allocation (Stack, Heap, Static)
11. Construction of a DAG (Directed Acyclic Graph)
12. Implementation of the Backend of the Compiler.

Text Books:

1. Introduction to Theory of computation, Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho , Ullman, ravisethi, Pearson Education

Reference Books:

1. Modern Compiler construction in C, Andrew W.Appel Cambridge University Press.
   Compiler Construction, LOUDEN, Cengage Learning.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	3			2								3	
CO3	3												2	
CO4	3				2								2	

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACS10 - RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes:
At the end of the course the student will be able to:
1. Design and implement a database schema for given problem.
2. Implement SQL queries using query language tools.
3. Apply the normalization techniques for development of application software to realistic problems.
4. Formulate queries using SQL tools for DML/DDL/DCL commands.

LIST OF EXPERIMENTS

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, EXCEPT operators. Example:, Select the roll number and name of the student who secured fourth rank in the class.

3. Using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING, Creation and dropping of Views.

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

5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii) Implement COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions.

8. Program development using a creation of procedures, passing parameters IN and OUT of PROCEDURES.

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

10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

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

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

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3										3	
CO2	3	3			3								3	
CO3	3	3											3	
CO4	3	3			3							2	3	

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)
II B.Tech I Semester (CSE (AI &ML))

L	T	P	C
1	-	2	2

20ACM01 - WEB APPLICATION DEVELOPMENT

(Skill Course)

Course Outcomes:

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

1. Understand the fundament concepts of HTML, CSS, and JavaScript for web development.
2. Recognize the concepts of responsive web development using the bootstrap framework.
3. Use JQuery Java script library to create interactive websites.
4. Apply Google Charts for better data visualization in website design

UNIT I:

HTML: What is a browser? What is HTML?, Elements and Tags, Basic HTML5 structure, Metadata, <title>, Adding favicon, Comments, headings.

Task 1: Create a Basic HTML document

Block-Level Elements & Inline Elements, Links (Understand Absolute vs Relative paths), Lists, Images, iframe (embed youtube video).

Task 2: Create your Profile Page

UNIT II:

Tables: <table>, <tr>, <th>, <td>, Attributes for each Table element

Task 3: Create a Class Timetable (to merge rows/columns, use rowspan/colspan)

Form Elements: <input>, <select>, <textarea>, <button>, Attributes for each Form element

Task 4: Create a Student Hostel Application Form

UNIT III:

Cascading Style Sheets (CSS): CSS Properties, Types of CSS, Selectors, box model, Pseudo-elements, z-index

Task 5: Make the Hostel Application Form designed in Unit -2 beautiful using CSS (add colors, backgrounds, change font properties, borders, etc.)

UNIT IV:

Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components

Task 6: Style the Hostel Application Form designed in Unit -3 still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution)

UNIT V:

HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

Task 7: Analyse various HTTP requests (initiators, timing diagrams, responses) and identify problems if any.

Online Courses & References:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program,Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. HTML: https://html.spec.whatwg.org/multipage/
4. HTML: https://developer.mozilla.org/enUS/docs/Glossary/HTML5
5. CSS: https://www.w3.org/Style/CSS/
6. Bootstrap - CSS Framework: https://getbootstrap.com/
7. Browser Developer Tools: https://developer.mozilla.org/en-
8. US/docs/Learn/Common_questions/What_are_browser_developer_tools

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3								3	
CO2	3	1	3		3								3	
CO3	3		3		3								-	
CO4	3	2			3								3	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE, ECE, CSE[AI&ML])

L	T	P	C
2	-	-	-

20AMB02 - UNIVERSAL HUMAN VALUES-I
(Mandatory course)

Course Outcomes:

After completion of the course students will be able to

1. Apply the principles of natural acceptance to design a happy and prosperous living with responsibility.
2. Analyse the elements of sentient 'I' and material human body to design a living with responsibility for happiness and prosperity.
3. Apply the principles of 'trust' and 'respect' for designing a society with universal human order.
4. Analyse the situations causing imbalance in nature and further design an ecosystem for peaceful co-existence.
5. Apply the principles of science technology and management to solve contemporary problems professionally and ethically.

UNIT – I: **Introduction - Need, Basic Guidelines, Content and Process for Value Education**

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

UNIT – II: Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material Body; Understanding the needs of Self ('I') and 'Body' - happiness and physical facility; Understanding the Body as an instrument of 'I' (I 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.

UNIT – III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship; Understanding the meaning of Trust; Difference between intention and competence; Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship; Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT – IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence of mutually interacting units in all- pervasive space;Holistic perception of harmony at all levels of existence

UNIT – V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists andmanagers

b. At the level of society: as mutually enriching institutions and organizations.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values andProfessional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.The Story of Stuff (Book).
3. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth" E. FSchumacher. "Small is Beautiful"Slow is Beautiful –Cecile Andrews J C Kumarappa "Economy of Permanence" Pandit Sunderlal "Bharat Mein Angreji Raj" Dharampal.
4. Rediscovering India. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland (English)Gandhi - Romain Rolland (English).

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3								3	
CO2	3	1	3		3								3	
CO3	3		3		3								-	
CO4	3	2			3								3	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS11 QUANTITATIVE APTITUDE AND REASONING-I

Course Outcomes:

After completion of the course the student will be able to

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT I

QUANTITATIVE ABILITY - I

Vedic Maths – Square - Square root – Cube - Cube root –Fractions – Mathematical operations – Number System – Types of numbers - Divisibility Rule – Unit Digit – Factors and Factorials – Remainder Theorem – Factorization and Trailing Zeroes – LCM And HCF

UNIT II

QUANTITATIVE ABILITY - II

Arithmetic Progression – Common Difference- Nth Term – Sum of terms – Geometric Progression – Common Ratio – Nth term – Sum of Terms – Averages - Weighted average – Percentages – Conversion – Increasing and decreasing in quantity – Change in Percentage – Successive discount – Compound Growth

UNIT III

REASONING ABILITY I

Coding and Decoding – Blood Relations – Directions – Number Series and Letter Series – Ranking and Ordering

UNIT IV

VERBAL I

Verbal analogy - Types - Parts of Speech – Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction and Interjection - Prepositions –Preposition of Place, Preposition of Placement, Preposition of Time and Preposition of Duration - Articles – Usage of a, an, the, Omission of articles - Sentences - Pattern and Types.

UNIT V

SOFT SKILL I

Communication Skills - Self-Confidence - Introductions & Greetings - Presentation Skills - Self-Motivation

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications

	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	-	-	-	-	-	-	-	-	-	-
CO 3	2	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech - II Semester (Common to CE, ME, CSE, CSM & IT)

L	T	P	C
3	1	0	3

20AHS13 PROBABILITY AND STATISTICS

Course Outcomes:

After completion of the course the student will be able to

1. Apply probability distributions to real life problems.
2. Analyze inference theory to make wise decisions about a population parameter.
3. Apply sampling methods in the day-to-daypractical life to assess the quality of commodities.
4. Apply the testing of hypothesis for large and small samples.

UNIT-I

RANDOM VARIABLES & THEORITICAL DISTRIBUTIONS:

Introduction on Probability - Discrete and Continuous random variables – Distribution functions – Moment generating functions. Binomial distribution – Poisson distribution – Normal distribution – related properties.

UNIT-II

SAMPLING DISTRIBUTIONS & ESTIMATION:

Population - Sample - Parameter and Statistic -Characteristics of a good estimator - Consistency– Invariance property of Consistent estimator - Sufficient condition for consistency- Unbiasedness – Sampling distributions of means (known and unknown)- sums and difference. Estimation- Estimator, Estimate, Point estimation – Interval estimation – Bayesian estimation.

UNIT-III

TEST OF HYPOTHESIS:

Null Hypothesis-Alternative hypothesis-Critical region – Level of Significance-Type I error and Type II errors-One tail test -Two tail tests - Hypothesis concerning one and two means – Hypothesis concerning one and two proportions.

UNIT-IV

TEST OF SIGNIFICANCE: Student's t-test, test for a population mean, equality of two population means, paired t-test, F-test for equality of two population variances, χ^2 -Chi-square test for goodness of fit and test for attributes.

ANALYSIS OF VARIANCE - One way and two-wayclassifications.

UNIT-V

QUEUING THEORY: Introduction - Queues with impatient customers: Balking and reneging-Classification, stationary process, Binomial process, Poisson process, Birth and

Text Books:

1. Miller and John Freund. E, Probability & Statistics for Engineers, New Delhi, Pearson Education, 2014.
2. S.P.Gupta,Statistical Methods,33rdEdition,publications SultanChand& Sons.2021.
3. Iyengar, T.K.V., Krishna Gandhi B., Probability & Statistics, New Delhi, S. Chand & Company, 2014.

References Books:

1. Arnold O Allen, Probability & Statistics, Academic Press. 2014.
2. Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference Testing of Hypotheses, Prentice Hallof India,2014.

CO-PO's Mapping:

CO/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	1	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-
Average	2.5	3	-	0.25	-	-	-	-	-	-	-	-
Level of Correlation of the Course	3	3	-	1	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech, II Semester (Common to CSE, CSD, CSM &IT)	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

20AHS14 DISCRETE STRUCTURES & GRAPH THEORY

Course Outcomes:
After Completion of the course the student will be able to

1. Apply the rules of inference to determine the validity of argument.
2. Apply lattice theory and Boolean algebra in theory and design of computers.
3. Apply generating functions to solve the combinatorial problems which makes easier to solve broad spectrum of problems.
4. Apply the graph theory and trees in describing structures involving hierarchy. Also used in switching and logical design.

UNIT-I:

MATHEMATICAL LOGIC AND PREDICATES: Statements and notations, Connectives, Well -formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.
Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof by contradiction.

UNIT-II:

SET THEORY AND BOOLEAN ALGEBRA: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Compositions of functions, Lattice and its Properties. Introduction to Boolean Algebra- Sub Algebra, Direct product and homomorphism.

UNIT-III:

ELEMENTARY COMBINATORICS: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT- IV:

RECURRENCE RELATION: Generating Functions, Sequences, Calculating Coefficient of generating functions, Recurrence relations. Solving recurrence relation by substitution. Generating functions and Characteristic equations (both homogeneous and non-homogeneous Recurrence Relation).

UNIT-V:

GRAPH THEORY: Representation of Graph, Directed Graph, Sub graphs, Isomorphism of Graphs, Planar Graphs, Connected Graphs, Euler and Hamiltonian circuits and their necessary and sufficient conditions for existence of Euler Circuits and Hamiltonian Circuits. (without Proof). Trees, Spanning and minimal spanning Trees, Prim's and Kruskal algorithm. Searching Algorithms of Trees - DFS, BFS.

Text Books:

1. Trembly J.P. &Manoha. P, Discrete Mathematical Structures with applications to computer science TMH. 2017.
2. Dr D.S. Chandrasekhara, Mathematical Foundations of computer science Prism books Pvt Ltd.2012.

Reference Books:

1. Bernand Kolman, Roberty C. Busby, Sharn Cutter, Discrete Mathematical Structures, Ross, Pearson Education/PHI. 2013
2. Mallik and Sen, Discrete Mathematical Structures, Thomson. 2004.
3. J.L. Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians Prentice Hall, 1986.

CO-PO's Mapping:

CO/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
Average	3	2.5	-	0.25	-	-	-	-	-	-	-	-
Level of Correlation of the Course	3	3	-	1	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (CSE (AI&ML))

II B.Tech II Semester (CSE Minor Degree [Industry relevant Track])

III B.Tech II Semester (ECE - Open Elective/ Job Oriented Elective –II)

IV B.Tech I Semester (CE-Open Elective Course / Job Oriented Elective Course – IV)

L	T	P	C
3	0	0	3

20ACM02 - ARTIFICIAL INTELLIGENCE FOR ENGINEERS

Course Outcomes:

After Completion of the course the student will be able to

1. Summarize and formulate appropriate logics and AI methods for problem solving.
2. Apply various searching, game playing, and knowledge representation techniques to solve the real world problems.
3. Analyze different expert systems and its applications.
4. Explain the concepts of probability theory.

UNIT I: **9 hrs.**

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI.

Problem solving: state – space search and control strategies: Introduction, general problem-solvingcharacteristics of problem.

UNIT II: **9 hrs.**

Search Strategies: exhaustive searches, heuristic search techniques: A* Algorithm and Hill Climbing, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha -beta pruning.

UNIT III: **9 hrs.**

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutationin proportional logic, predicate logic.

UNIT IV: **9 hrs.**

Knowledge representation: Introduction, approaches to knowledge representation, knowledge Representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory.

UNIT V: 9 hrs.

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule- based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster- shafer theory, Case Study.

Text Books:

1. Artificial Intelligence by Saroj Kaushik, CENGAGE Learning.
2. Artificial intelligence, A modern Approach, by Stuart Russel and Peter Norvig Second Edition, PEA.
3. Artificial Intelligence by Rich, Kevin Knight, Shiv Shankar B Nair, 3rd edition, TMH.
4. Introduction to Artificial Intelligence by Patterson, PHI.

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA.
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer.
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier.

Online Courses:

1. NPTEL Course: Fundamentals of Artificial Intelligence https://nptel.ac.in/courses/112/103/112103280/
2. NPTEL Course: Introduction to Artificial Intelligence https://nptel.ac.in/courses/106/102/106102220/

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	3	3	2
CO2	3	2	-	-	3	-	-	-	-	-	-	2	3	2
CO3	3	2	-	3	-	-	-	-	-	-	-	3	3	2
CO4	3	3	-	-	3	-	-	-	-	-	-	3	3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	-	3

20ACS13 OPERATING SYSTEMS

Course Outcomes:

After Completion of the course the student will be able to

1. Apply the knowledge of operating system fundamental concepts to manage the computer resources.
2. Evaluate the performance of scheduling algorithms which is best suited in a multiprogramming environment.
3. Develop an algorithm to check the resources are effectively used in an operating system's component in a shared environment
4. Analyze an operating system's components to manage the user data.

UNIT I

INTRODUCTION TO OS **8hrs**

Functionality of OS - OS Design issues - Structuring methods (monolithic, layered, modular, micro-kernel models) Overview of computer operating systems, protection and security, distributed systems, special purpose systems, operating systems structures: operating system services and systems calls, system programs, operating system structure, operating systems generation.

UNIT II

SCHEDULING **8hrs**

Process concepts, Cooperating processes, Inter process communication. Threads: Overview, Multithreading models, PThreads. CPU Scheduling: Basic concepts, Scheduling criteria, Algorithms, and their evaluation.

UNIT III

PROCESS SYNCHRONIZATION & DEADLOCK **8hrs**

Process synchronization, The critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Deadlocks: System model, deadlock characterization, Methods for handling deadlock, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT IV 7hrs

MEMORY MANAGEMENT STRATEGIES

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory: demand paging, page replacement, algorithms, allocation of frames, Thrashing case studies UNIX, Linux, Windows 100

UNIT V 8hrs

FILE SYSTEM INTERFACE

File concepts, 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, Mass-storage structure: Disk structure, disk scheduling, disk management, swap-space management and disk attachment.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne-Operating System Concepts, Wiley (2012).

Reference Books:

1. RamezElmasri, A Carrick, David Levine, Operating Systems, A Spiral Approach - McGrawHill Science Engineering Math (2009).

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										3	3
CO2	3	3	2	3	1								3	3
CO3	3	2	1										3	3
CO4	3	2											3	3

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B. Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML)

L	T	P	C
3	-	-	3

20AIT04 SOFTWARE ENGINEERING

Course Outcomes:

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

1. Design software requirements specifications for given problems.
2. Implement structure, object oriented analysis and design for given problems.
3. Design test cases for given problems.
4. Apply quality management concepts at the application level

UNIT - I

BASIC CONCEPTS IN SOFTWARE ENGINEERING AND SOFTWARE PROJECT MANAGEMENT: Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

UNIT - II

REQUIREMENTS ANALYSIS AND SPECIFICATION: The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques, axiomatic specification, algebraic specification.

UNIT -III

SOFTWARE DESIGN: Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function-oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object-oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good userinterface, User Guidance and Online Help, Mode-based vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology

UNIT - IV

CODING AND TESTING: Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

UNIT-V

SOFTWARE QUALITY, RELIABILITY, AND OTHER ISSUES: Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.

Text Books:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.

Reference Books:

1. Somerville, "Software Engineering", Pearson 2.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. JalotePankaj, "An integrated approach to Software Engineering", Narosa

Online Learning Resources:

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

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										3	3
CO2	3	3	2	3	1								3	3
CO3	3	2	1										3	3
CO4	3	2											3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech II Semester (CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACM03 - ARTIFICIAL INTELLIGENCE LAB

Course Outcomes:

After Completion of the course the student will be able to

1. Implement different search algorithms.
2. Apply appropriate logic concepts and AI methods for solving a problem.
3. Implement game playing techniques
4. Design Chabot and virtual assistant

Experiments:

1. Write a program to implement Breadth First Search Traversal.
2. Write a program to implement Depth First Search Traversal.
3. Write a program to implement Water Jug Problem.
4. Write a program to find the solution for traveling salesman Problem.
5. Write a program to implement 8 puzzle problem.
6. Write a program to implement Towers of Hanoi problem.
7. Write a program to implement A* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Write program to implement simple Chatbot.
10. Build a bot that provides all the information related to your college.
11. Write a program to sort the sentence in alphabetical order.
12. Write a program to implement Tic-Tac-Toe game.

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence: a Modern Approach, Pearson.
2. N. J. Nilsson, Principles of Artificial Intelligence, Narosa.

Reference Books:

1. Artificial Intelligence with Python by Prateek Joshi, Packt.
2. Artificial Intelligence with Python Cookbook by Ben Auffarth, Packt.
3. Artificial Intelligence with Python, By Alberto Artasanchez, Prateek Josh,2nd ed,Packt.

ONLINE LEARNING RESOURCES/VIRTUAL LABS:

1. https://www.tensorflow.org/
2. https://pytorch.org/
3. https://github.com/pytorch
4. https://keras.io/
5. https://github.com/keras-team
6. http://deeplearning.net/software/theano/
7. https://github.com/Theano/Theano
8. https://caffe2.ai/
9. https://github.com/caffe2
10. https://deeplearning4j.org/Scikit-learn:https://scikit-learn.org/stable/
11. https://github.com/scikit-learn/scikit-learn
12. https://www.deeplearning.ai/
13. https://opencv.org/
14. https://github.com/qqwweee/keras-yolo3
15. https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/
16. https://developer.nvidia.com/cuda-math-library

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	2	-	-	-	-	-	-	-	-	3	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	3
CO4	3	-	-	-	-	-	-	-	-	-	-	3	3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

	L	T	P	C
	-	-	3	1.5

20ACS15 OPERATING SYSTEMS LAB

Course Outcome:

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

1. Execute the basic command in UNIX operating system and shell program.
2. Simulate the principles of CPU scheduling concepts.
3. Simulate the principles of synchronization and contiguous memory allocation technique.
4. Simulate the principle of page replacement algorithm

LIST OF EXPERIMENTS

1. Explain the following system calls in UNIX operating system (fork, exec, mkdir, cat, open, date, history, clear, pwd, ls, cd)
2. Write a shell script program
   (a) To perform arithmetic operations.
   (b) To find the given number is odd or even
3. Implement the various process scheduling mechanisms such as FCFS, SJF, Priority, round – robin.
4. Implement the solution for reader – writer's problem.
5. Implement the solution for dining philosopher's problem.
6. Implement banker's algorithm.
7. Implement the first fit; best fit and worst fit file allocation strategy.
8. Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU
9. Write a C program to simulate disk scheduling algorithm a)FIFO b)SCAN c)CSCAN

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										3	3
CO2	3	3	2	3	1								3	3
CO3	3	2	1										3	3
CO4	3	2											3	3

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE(AI &ML)

L	T	P	C
-	-	3	1.5

20AIT05 SOFTWARE ENGINEERING LAB

Course Outcomes:

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

1. Acquaint with historical and modern software methodologies
2. Understand the phases of software projects and practice the activities of each phase
3. Practice clean coding
4. Take part in project management
5. Adopt skills such as distributed

List of Experiments:

1. Draw the Work Breakdown Structure for the system to be automated
2. Schedule all the activities and sub-activities Using the PERT/CPM charts
3. Define use cases and represent them in use-case document for all the stakeholders of the system to be automated
4. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
5. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause& Effect Diagram)
6. Define Complete Project plan for the system to be automated using Microsoft Project Tool
7. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document
8. Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document
9. Develop a tool which can be used for quantification of all the non-functional requirements
10. Write C/Java/Python program for classifying the various types of coupling.
11. Write a C/Java/Python program for classifying the various types of cohesion.
12. Write a C/Java/Python program for object oriented metrics for design proposed by Chidamber and Kremer. (Popularly called CK metrics)
13. Draw a complete class diagram and object diagrams using Rational tools

References:

1. Software Engineering? A Practitioner‟ s Approach, Roger S. Pressman, 1996, MGH.
2. Software Engineering by Ian Sommerville, Pearson Edu, 5th edition, 1999
3. An Integrated Approach to software engineering by Pankaj Jalote , 1991 Narosa

Online Learning Resources/Virtual Labs:

http://vlabs.iitkgp.ac.in/se/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	2	3		3				3					3	
CO3	2	3											3	1
CO4	3													
CO5	3													

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech II Semester (Common to CSE, CSE (DS), CSE (AIML))

	L	T	P	C
Code: 20ACD04	1	0	2	2

DATA ANALYTICS WITH R

course outcome:

1. Apply the knowledge of basic programming and execute R program using supported functionalities to solve real time applications.
2. Apply the knowledge of pre-processing techniques, to transform variables to facilitate analysis.
3. Design an effective model which enhance the prediction accuracy
4. To apply the knowledge of visualization technique to interpret the analysed data.

List of Experiments

1. Experiments on various data structures available in R.

1) Write a R program to simulate functional programming of statistical parameter (mean,median and mode)
2) Simulate the concept of data cleaning using data set.
3) Simulate the concept of handling missing values with average.
4) Implement the various plotting scheme using R.
5) Bar chart (ii) Scatter plot (iii) Box plot
6) To understand and implement the concept of loop statement
7) To understand and implement the concept of vectors
8) To understand and implement the concept of various models in R
9) To understand and implement the concept of various data transformation techniques

Text Book(s)

10) Norman Matloff, The Art of R Programming: A Tour of Statistical Software Design, No Starch Press Edition: 2011
11) Garrett Grolemund, Hadley Wickham, R for Data Science, O'Relly,2016

Reference Books

12) Beginning Data Science in R: Data Analysis, Visualization, and Modelling for the Data Scientist. by Thomas Mailund

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3										3	3
CO2	3	3	2	1	3								3	3
CO3	3	3	2	2									3	3
CO4	2	2	2										3	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - II Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS15 QUANTITATIVE APTITUDE AND REASONING-II

Course Outcomes:

After completion of the course the student will be able to

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT I
QUANTITATIVE ABILITY III

UNIT II
QUANTITATIVE ABILITY IV

Time Speed and Distance – Uniform and Variable speed – Conversion - Average Speed –Relative Speed – Effective speed - Problems on Trains – Stationary point and object – Moving Point and Object – Boats and Streams – Downstream and Upstream - Races and Games – Head start – Dead Heat – Escalator – Number of steps

UNIT III
REASONING ABILITY II

Syllogism – Statement and Conclusion - Data Sufficiency – Data Arrangement – Linear and Circular arrangement - Data Interpretation - Line Graph – Bar graph – Pie Chart -

UNIT IV
VERBAL II

Tense – Present Tense, Past Tense, Future Tense - Voice – Active voice, Passive voice and Active to Passive Voice Conversion Rules – Speech – Direct Speech, Indirect Speech and Direct to Indirect Speech Conversion Rules –Essay Writing – Types, Steps, Format.

UNIT V
SOFT SKILL II

Time Management - Stress Management - Team Work - Accent and Voice Communication - Interview Skills.

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1	3	2	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	-
CO 3	2	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

COURSE STRUCTURE AND DETAILED SYLLABI FOR

FOUR YEARS B. TECH

UNDER ACADEMIC REGULATIONS R20

FOR

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With Specialization in
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SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
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SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY [AUTONOMOUS]

II B. Tech II Semester CE, ME& ECE

III B. Tech I Semester EEE, CSE, IT, CSE(AI&ML), & CSE(DS)

L	T	P	C
3	0	0	3

20AMB03 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to All Branches)

Course Outcomes:

After the completion of the course student will be able to

CO1: Explain the fundamental concepts and theoretical principles of the Economics

CO2: Apply economic principles for problem solving.

CO3: Identify market structures and types of business organizations.

CO4: List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting

CO5: Explain the basic concepts of book keeping and accounting, and analyze financial statements.

UNIT –I: INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, Nature and Scope –Demand analysis: Law of demand, Demand determinants, Elasticity of Demand: Definition, Types, Measurement and Significance –Demand forecasting methods (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach)

UNIT –II: THEORY OF PRODUCTION AND COST ANALYSIS: Production function –Cobb Douglas Production function –Laws of Returns– Internal and External economies of scale COST ANALYSIS: Cost concepts, Fixed vs. Variable costs, Explicit vs. Implicit Costs, Out of Pocket costs Vs Imputed costs, Opportunity Cost and Sunk costs BREAK EVEN ANALYSIS: Concept of Break EvenPoint (BEP)–Break Even Chart –Assumptions underlying and Practical significance of BEP (Simple Problems).

UNIT –III: INTRODUCTION TO MARKETS AND BUSINESS ORGANIZATIONS: Market structures –Types of Competition –Features of perfect competition, Monopoly, Monopolistic competition –Price-Output Determination under perfect competition and Monopoly –Types of Business organization – Features, Merits and demerits of Sole proprietorship, Partnership and Joint stock companies –Types of companies –Public enterprises –Types and Features –Changing business environment in post –Liberalization scenario.

UNIT –IV: CAPITAL AND CAPITAL BUDGETING: Capital and its Significance –Types of capital –Estimation of fixed and working capital requirements–Methods and sources of raising capital – Capital Budgeting Methods: Payback Method, Accounting Rate of Return (ARR), and Net Present Value (NPV) Method (Simple Problems).

UNIT –V: FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS THROUGH RATIOS: Double entry book keeping –Journal –Ledger –Trial Balance –Trading Account and balance sheet with simple adjustments Ratio analysis: Computation of Liquidity Ratios (Current and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt-Equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS).

Text Books:
1. Aryasri A. R., Managerial Economics and Financial Analysis, 4/E, TMH, 2009.
2. Varshney R.L. and K.L. Maheswari, Managerial Economics, Sultan Chand & Sons, 19/E, 2009.
3. Siddiqui S.A. and Siddiqui A.S., Managerial Economics and Financial Analysis, New Age international, 2009.

Reference Books:
1. Gupta R.L., Financial Accounting, Volume I, Sultan Chand & Sons, New Delhi, 2001
2. James C. Van Horne, Financial Management policy, 12/E, PHI, 2001.
3. Joel Dean, Managerial Economics, PHI, 2001.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	2	-	1	-	-	-	-	-	-	3	-
CO2	-	2	-	2	-	1	-	-	-	-	-	-	3	2
CO3	-	-	1	-	-	-	1	-	-	-	3	-	2	2
CO4	-	2	1	2	-	1	1	-	-	-	3	-	2	2
CO5	-	-	1	-	-	-	-	-	-	-	-	-	2	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY [AUTONOMOUS]

III B.Tech I Semester (Common to CSE, IT, CSE (DS), CSE (AI & ML))

L	T	P	C
3	0	0	3

20ACS16 - WEB TECHNOLOGIES

Course Outcomes:

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

1. Apply HTML Structure Elements to create web page and apply CSS to styling webpages.
2. Design Client-Side programs using JavaScript and Server-Side programs using PHP to construct dynamic webpages.
3. Understand and implement Object Oriented Programming capabilities of PHP
4. Apply intermediate and advanced web development practices.

UNIT- I **9 Hrs**

Introduction to HTML: HTML, HTML Syntax, Semantic Markup, Structure of HTML Documents, HTML Elements, HTML5 Semantic Structure Elements. HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats.

UNIT-II **9 Hrs**

Introduction to CSS: CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.

Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.

UNIT-III **9 Hrs**

JavaScript: Fundamentals, Ways to JavaScript can be linked to an HTML page, Variables and data types, Conditional, Loops, Arrays, Objects, Functions, Object Prototypes, The Document Object Model (DOM), Modifying the DOM, Events, Event Types, Forms.

JavaScript frameworks: Node.js, MongoDB, AngularJS.

Extending JavaScript with jQuery: jQuery Foundations, Event Handling in jQuery, DOM Manipulation, Effects and Animation, AJAX, Asynchronous File Transmission,

UNIT-IV **9 Hrs**

PHP: PHP Tags, Comments, Variables, Data Types, and Constants, Writing to Output, printf, Program Control, Functions, Arrays and Superglobals, Arrays, $GET and $POST Superglobal Arrays, $SERVER Array, $Files Array, Reading/Writing Files.

PHP Classes and Objects: Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, Errors and Exceptions, PHP Error Reporting, PHP Error and Exception Handling.

Working with Databases: SQL, NoSQL, Database APIs, managing a MySQL Database, Accessing MySQL in PHP.

UNIT-V **9 Hrs**

Managing State: The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching.

XML Processing and Web Services: XML Processing, JSON, Overview of Web Services. Content Management Systems, Search Engines, Social Networks and Analytics.

TEXT BOOK:

1. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 2nd Edition, Pearson Education India, 2018.

REFERENCE BOOKS:

1. Robin Nixon, "Learning PHP, MySQL &JavaScript with jQuery, CSS and HTML5", 4^{th} Edition, O'Reilly Publications, 2015. (ISBN:978-9352130153)
2. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016. (ISBN:978-9332582736)
3. Nicholas C Zakas, "Professional JavaScript for Web Developers", 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088)
4. David Sawyer Mcfarland, "JavaScript & jQuery: The Missing Manual", 1st Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN: 978-9351108078)
5. Zak Ruvalcaba Anne Boehm, "Murach's HTML5 and CSS3", 3rdEdition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016. (ISBN:978-9352133246)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	-	-	3	-	-	-	-	-	-	3	2	-
C02	3	2	-	-	3	1	-	-	-	3	-	3	2	-
C03	3	3	3	-	-	1	1	-	-	-	-	3	2	-
C04	-	-	3	3	3	-	-	1	-	-	1		-	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. Tech I Semester (Common to CSE, IT, CSE (DS), CSE (AI & ML))
III B. Tech I Semester EEE (Open Elective-I)
IV B. Tech I Semester ME (Open Elective-I)

L	T	P	C
3	0	0	3

20ACS17 - COMPUTER NETWORKS

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

1. Describe various components and topologies of computer networks
2. Use the network reference model layered structure for real time applications.
3. Implement various routing protocols from different layers.
4. Design, implement and test an efficient algorithmic solution for the give problem.
5. Analyse network security mechanics and other issues in the application layer.

UNIT- I **13 hours**

Introduction: Uses of Computer Networks, Network Hardware, Network Topologies, Network Software, References Models.

The Data Link Layer: Data link Layer Design Issues, Elementary Data Link Protocols, and Sliding Window Protocols.

UNIT-II **10 hours**

The Medium Access Control Sublayer: Channel allocation Problem, Multiple Access Protocols, Ethernet: Classic Ethernet physical layer, Ethernet MAC Sublayer Protocol, Ethernet Performance, Switched Ethernet, Fast Ethernet, Gigabit Ethernet,10-Gigabit Ethernet, Wireless LANs: The 802.11 Protocol Stack, 802.11 Physical Layer,802.11 MAC Sublayer Protocol, 802.11 Frame Structure,

UNIT-III **10 hours**

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internetworking, Network Layer in the Internet.

UNIT-IV **8 hours**

The Transport Layer: Transport Service, Elements of Transport Protocols, Internet Transport Protocols: UDP, Internet Transport Protocols: TCP.

UNIT-V **5 hours**

The Application Layer: Domain Name System, Electronic Mail. World Wide Web.

Total: 46Hrs

TEXT BOOK:

1. Computer Networks, Fifth Edition, Andrew S. Tanenbaum, David J Wetherall Pearson Education, 2011.

REFERENCE BOOKS:

1. Data Communications and Networking, Fifth Edition, Behrouz A. Forouzan, Tata McGraw Hill,2012.
2. Computer Networking: A Top, Down Approach Featuring the Internet, Six Edition, James F. Kurose, K.W. Ross, Pearson Education,2013
3. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning,2001.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	-	2	-
C02	3	3	1	-	-	-	-	-	-	-	2	-	2	-
C03	3	2	3	-	1	-	-	-	-	-	2	3	2	-
C04	-	1	2	1	1	-	-	-	-	-	-	2	-	1
C05	-	-	-	1	1	-	-	-	-	-	-	1	-	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY [AUTONOMOUS]

II B. Tech II Semester (Common to CSE, IT, CSE (DS))

III B. Tech I Semester CSE (AI & ML)-PE-I

L	T	P	C
3	0	0	3

20ACS12 - DESIGN AND ANALYSIS OF ALGORITHM

(Professional Elective - I)

Course Outcomes

1. Analyze the complexity of algorithms by applying the knowledge of asymptotic notations andrecurrence methods.
2. Analyze the given problem and identify appropriate algorithm design technique for problemsolving.
3. Perceive and apply different algorithm design paradigms to find solutions for computingproblems.
4. Apply the knowledge of NP-hard and NP-Complete complexity classes to classify decisionproblems.

UNIT-I Basics of Algorithms and Mathematics **8hr**

What is an algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Spacecomplexity, Time complexity.

Analysis of Algorithm: Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (θ), and Little-oh notation (o), Mathematical analysis of non-Recursive and recursive Algorithms with Examples. Important Problem Types: Sorting, Searching, String processing.

UNIT-II ` Divide and Conquer Algorithm **9hrs**

Introduction, multiplying large Integers Problem, Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication. Greedy Algorithm General Characteristics, Problem solving, Activity selection problem, Elements of Greedy Strategy, Minimum Cost Spanning trees, Prim’s Algorithm, Kruskal’s Algorithm. Single source shortest paths: Dijkstra's Algorithm, The Knapsack Problem, Job Scheduling Problem.

UNIT-III Dynamic Programming **8hrs**

Introduction, General method with Examples, Multistage Graphs Transitive Closure: Warshall‟s Algorithm All Pairs Shortest Paths: Floyd's Algorithm, Optimal

Binary Search Trees, Knapsack problem, Bellman-Ford Algorithm, Travelling Sales Person problem.

UNIT-IV Exploring Graph 7hrs

Introduction, Traversing Trees – Preconditioning, Undirected Graph, Directed Graph, Depth First Search, Breath First Search, Sum of subsets problem, 0/1 The Knapsack Problem, Graph coloring, Hamiltonian cycles.

UNIT-V Backtracking 8hrs

Introduction, General Template The naive string-matching algorithm, The Rabin, Karp algorithm,String Matching with finite automata, The four queens' problem, The Eight queens' problem.

Introduction to NP, Completeness:

The class P and NP, Polynomial reduction, NP Completeness Problem, NP Hard Problems.

Text Books:

1. Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, Fundamentals of ComputerAlgorithms, 2nd Edition, Universities Press, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction toAlgorithms,3rd Edition, MIT Press, 2009.
3. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 2rd Edition, 2009.Pearson.

Reference Books:

1. Design and Analysis of Algorithms, Parag Himanshu Dave and Himanshu BhalachandraDave, Pearson,2009.
2. Fundamental of Algorithms by Gills Brassard, Paul Bratley, PHI,1996.
3. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson,2011.
4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest,Clifford Stein, 3rd Edition, PHI.

CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	3	3											3	
CO2	3	3	1										3	2
CO3	3	3											3	1
CO4	3	3											3	2

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. Tech I Semester
(Common to CSE, IT, CSE (DS), CSE (AI & ML))

L	T	P	C
3	0	0	3

20ACS18 - CRYTOGRAPHY AND NETWORK SECURITY
(Professional Elective -I)

COURSE OUTCOMES:
At the end of the course the student will be able to:

1. Identify different types of Attacks and interpret various cryptography techniques.
2. Select the appropriate cryptography algorithm based on the requirements and Applications.
3. Apply Hash algorithm for generating Digital signatures.

UNIT – I **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 – II **9**

Symmetric Key Ciphers : Modern Block Ciphers - DES,AES.
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 – III **9**

Stream Ciphers and Pseudorandomness : Stream Ciphers and Pseudorandom Functions.
Hash Functions and MACs : The Merkle Damgard Construction and Message Authentication Codes.

UNIT – IV **9**

Asymmetric Key Ciphers: Construction and Cryptanalysis - More Number Theoretic Results, The RSA Cryptosystem, Primality Testing, Factoring Algorithms, Other attacks on RSA and Semantic Security of RSA, The Discrete Logarithm Problem (DLP) and the Diffie Hellman Key Exchange Algorithm, The ElGamal Encryption Algorithm, Cryptanalysis of DLP.

UNIT V **9**

Digital Signatures : Signature schemes.
Modern Trends in Asymmetric Key Cryptography : Elliptic Curve Based Cryptography.
Network Security : Secret Sharing Schemes, A Tutorial on Network Protocols, Kerberos, Pretty Good Privacy (PGP), Secure Socket Layer (SSL), Intruders and Viruses, Firewalls.

TOTAL=45Hrs.

TEXT BOOK:
1. Douglas Stinson, "Cryptography Theory and Practice", 2nd Edition, Chapman & Hall/CRC.
2. B. A. Forouzan, "Cryptography & Network Security", Tata Mc Graw Hill.
3. W. Stallings, "Cryptography and Network Security", Pearson Education.

REFERENCES:

1. Wenbo Mao, "Modern Cryptography, Theory & Practice", Pearson Education.
2. Hoffstein, Pipher, Silvermman, "An Introduction to Mathematical Cryptography", Springer.
3. J. Daemen, V. Rijmen, "The Design of Rijndael", Springer.
4. A. Joux,"Algorithmic Cryptanalysis", CRC Press.
5. S. G. Telang, "Number Theory", Tata Mc Graw Hill.
6. C. Boyd, A. Mathuria, "Protocols for Authentication and Key Establishment", Springer.
7. Matt Bishop, "Computer Security", Pearson Education.
8. https://nptel.ac.in/courses/106105031

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3												2	1
C02	3	3	1								2		2	1
C03	3	2	3		1						2	3	2	1

3 -High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH I-SEMESTER (Common to IT, CSE[AI&ML])

L	T	P	C
3	0	0	3

20AIT10 HUMAN COMPUTER INTERACTION

(Professional Elective -I)

OUTCOMES:

Upon completion of the course, the students should be able to:

CO1: Design effective dialog for HCI.
CO2: Design effective HCI for individuals and persons with disabilities.
CO3: Assess the importance of user feedback.
CO4: Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
CO5: Develop meaningful user interface.

UNIT I FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies

UNITII DESIGN & SOFTWARE PROCESS

Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design

UNIT III MODELS AND THEORIES

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNITIV MOBILE HCI

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies

UNIT V WEB INTERFACE DESIGN

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, ―Human Computer Interaction‖, 3rd Edition, Pearson Education, 2004
2. Brian Fling, Mobile Design and Development‖, First Edition, O‘Reilly Media Inc., 2009

REFERENCE BOOKS:

1. Bill Scott and Theresa Neil, ―Designing Web Interfaces‖, First Edition, O'Reilly, 2009.

CO – PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	3	-	-	-	1	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	1
CO4	3	2	3	3	2	-	-	-	-	-	-	-	3	2
C05	2	2	-	-	-	-	-	-	-	-	-	-	2	1

3 -High mapping   2-Medium Mapping   1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH I-SEMESTER CSE[AI&ML]

III B. TECH I-SEMESTER (IT – Professional Elective- II)

L	T	P	C
3	0	0	3

20ACM04 - PATTERN RECOGNITION

(Professional Elective -I)

COURSE OUTCOME:

- Use Various Statistical, Syntactic and Neural Network Approaches of PR and their applications.
- Explain fundamentals of Pattern Recognition using statistical models for Data Analysis.
- Identify different Unsupervised Learning algorithms to recognize data regularities and patterns.
- Apply the Syntactic and Neural pattern recognition techniques for the measure of structural similarities in the patterns.

UNIT I: INTRODUCTION TO PATTERN RECOGNITION 9

Pattern recognition, Classification and Description, Pattern Mapping, Patterns and Feature Extraction with examples, Classifiers, Decision Regions, Boundaries, Training and learning in pattern recognition systems, Pattern recognition approaches and Comparison, Black Box approaches, Reasoning driven pattern recognition.

UNIT II: STATISTICAL PATTERN RECOGNITION 9

Introduction to StatPR, Statistical models, Gaussian case and Class Dependence, Discriminant Functions- Uniform Densities, Classifier Performance, Risk and Errors, Introduction to Supervised learning, Parametric estimation – Maximum Likelihood Estimation, Bayesian parameter estimation, Non-parametric approaches- Density estimation, Parzen Windows.

UNIT III: UNSUPERVISED LEARNING AND CLUSTERING 9

Formulation of unsupervised problems, Unsupervised Learning Approaches, Clustering for unsupervised learning and classification, c-means algorithm, Learning Vector Quantization, Formal Characterization of General Clustering Procedures, Hierarchical clustering procedure.

UNIT IV: SYNTACTIC PATTERN RECOGNITION 10

Syntactic Pattern Recognition, Grammar based approaches, Formal Grammars, Types of Grammars, String generation as Pattern Description, Recognition by String Matching and Parsing, Cocke-Younger-Kasami (CYK) Parsing Algorithm, Augmented Transition Networks.

UNIT V: NEURAL PATTERN RECOGNITION 8

Neural Networks fundamentals, Learning in Neural networks, Physical Neural Networks, Artificial Neural Networks model, activation functions, weights- Neural Network based Pattern Associators.

Total: 45 Hrs

Text Books/Reference Books:

1. Robert J, Schalkoff, "Pattern Recognition: Statistical, Structural and Neural Approaches", John Wiley & Sons Inc., New York, Reprint 2014.
2. Earl Gose, Richard John son baugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India Private Ltd., New Delhi – 110 001, 1999.
3. Duda R.O. and Hart P.E., "Pattern Classification and Scene Analysis", Wiley, New York, 1973.
4. Christopher M. Bishop, "Neural Network for Pattern Recognition", Oxford University Press, 2008.
5. Chen C H, "Handbook of Pattern Recognition and Computer Vision", 4th Edition World Scientific co, Pvt. Ltd., 2010.
6. http://www.byclb.com/TR/Tutorials/neural_networks/

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	3	3
CO2	3	2	3	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	-	-	-	-	-	-	-	-	3	2
CO4	3	2	3	-	-	-	-	-	-	-	-	3	3

3- High Mapping 2-Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH I-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM05 - ARTIFICIAL NEURAL NETWORKS

(Professional Elective Courses-I)

Course Outcomes:

By completing this course, the student will be able to:

- Explain fundamentals of Neural Networks for Knowledge Representation.
- Identify the use of Single and multilayer perceptron classifier models.
- Apply Backpropagation to train the artificial neural network in reducing the error rates.
- Apply different learning rules for training Neuro Dynamic Models and make the model reliable.

UNIT – I 9

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem.

UNIT – II 9

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule.

UNIT – III 9

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT – IV 9

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

UNIT – V 9

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm **Hopfield Models** – Hopfield Models, Computer Experiment

Total: 45 Hrs

TEXT BOOKS:

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.
2. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005

REFERENCE BOOKS:

1. Neural Networks in Computer Inteligance, Li Min Fu MC GRAW HILL EDUCATION 2003
2. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
3. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	3	3
CO2	3	3	2	-	-	-	-	-	-	-	-	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	3	3
CO4	3	2	2	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. TECH I SEMESTER (COMMON TO CSE, IT, CSE(DS), CSE (AI &ML))

L	T	P	C
3	0	0	3

20AEC31 -DIGITAL LOGIC DESIGN
(Open Elective-I)

Course Outcomes:

After Successful completion of the course the student will be able to:

CO1: understand the number system and boolean algebra.

CO2: Implement various boolean expressions using logic gates.

CO3: Design combinational and sequential circuits for various practical applications.

CO4: Implement LSI and MSI circuits using programmable logic devices (PLDs)

UNIT- I NUMBER SYSTEM & BOOLEAN ALGEBRA:

Digital systems, Binary Numbers, Octal Numbers, Hexadecimal Numbers, Number base conversions, complements of numbers, Signed Binary numbers, Binary Arithmetic: addition, subtraction, multiplication, division Binary codes. Boolean algebra – Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Digital logic gates.

UNIT-II GATE LEVEL MINIMIZATION:

The map method, four variable K-map, five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, other two-level Implementations, Exclusive-OR Function.

UNIT- III COMBINATIONAL CIRCUITS:

Combinational circuits, Analysis & Design procedure, Binary Adder and Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, De-multiplexers, Code Converters, priority encoders, Realization of Switching Functions Using PROM, PAL and PLA

UNIT-IV SEQUNTIAL CIRCUITS:

Sequential Circuits, Latches, Flips-Flops, Conversion of Flip Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, Design of modulo-N Counters, Ring and Johnson Counters

UNIT-V MEMORIES:

Random - Access Memory, Memory Decoding, Error Detection and correction, Read - Only Memory, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Sequential Programmable Devices.

Text Books:

1) Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.

2) Fundamentals of Logic Design, 5/e, Roth, Cengage. **Reference Books:**

1) Digital Logic and Computer Design, M.Morris Mano, PEA.

2) Digital Logic Design, Leach, Malvino, Saha, TMH.

3) Modern Digital Electronics, R.P. Jain, TMH.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3									3	
CO2	3	3	3	3									3	
CO3	3	3	3	3									3	1
CO4	3	3	3	3									3	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (Common to CSE, IT, CSE(DS), CSE (AI &ML))

IV B. Tech I Semester ME (Open Elective – III)

L	T	P	C
3	0	0	3

20ACE35 -INTEGRATED WASTE MANAGEMENT FOR SMART CITY (Open Elective -I)

Course Outcomes:

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

1. Understand the current issues and management in solid waste.
2. Apply basics of municipal solid waste management.
3. Apply various disposal methods of solid waste
4. Understand the construction and demolition waste management processes.
5. Explain management of electronic waste

UNIT-I

INTRODUCTION TO SOLID WASTE MANAGEMENT:

Municipal Solid Waste Sources; composition; generation rates Swachh Bharat Mission and Smart Cities Program, Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country.

UNIT-II

MUNICIPAL SOLID WASTE MANAGEMENT:

Municipal Solid Waste, Characteristics and Quantities, Collection, Transportation, Segregationand Processing.

UNIT-III

DISPOSAL OF MUNICIPAL SOLID WASTE:

Landfill, Biochemical Processes and Composting, Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016.

UNIT-IV

CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT:

Overview of C&D Waste – Sources, Effects, and Regulations, Beneficial Reuse of C&DWaste Materials.

UNIT-V

ELECTRONIC WASTE (E-WASTE) MANAGEMENT:

Sources, Effects, Issues and Status in India and globally, controlling measures, E-Waste Management Rules 2016 and Management Challenges.

TEXT BOOKS

1. William A Worrell and P. AarneVeslind, "Solid Waste Engineering", 2nd Edition Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)
2. George Tchobanoglous, Hilary Theisen and Samuel A Vigil, "Integrated Solid Waste Management", Tata McGraw Hill, 1993.
3. The Central Public Health and Environmental Engineering Organization (CPHEEO),"Manual on Solid Waste Management", India, 2016.

REFERENCES

1. “Municipal Solid Waste Management Rules 2016”, Central Pollution Control Board, Govt.of India, 2016.
2. “Electronic Waste Management Rules 2016”, Central Pollution Control Board, Govt. of India, 2016.
3. “Construction and Demolition Waste Management Rules 2016”, Ministry of Environmentand Forest and Climate Change, Govt. of India, 2016.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	3	3	-	-	-	-	-	3	3
CO2	3	-	-	-	-	3	3	-	-	-	-	-	3	3
CO3	3	-	-	-	-	3	3	-	-	-	-	-	3	3
CO4	3	-	-	-	-	3	3	-	-	-	-	-	3	3
CO5	3	-	-	-	-	3	3	-	-	-	-	-	3	3
AVG	3	-	-	-	-	3	3	-	-	-	-	-	3	3
Level of correlation of the course	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**3**

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (Common to CSE, IT, CSE[DS], CSE[AI&ML] & EEE)

III B. Tech - I – Semester ME

L	T	P	C
3	0	0	3

20AME18- ROBOTICS AND ARTIFICIAL INTELLIGENCE
(Open Elective -I)

Course Outcome:

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

1. Demonstrate the knowledge in an application of AI, and select strategies based on application requirement.
2. Describe the basic concepts of robotics and its importance in the modern world and classification of robots and its end effectors for typical manufacturing industry and service sector.
3. Summarize the perception about robot components, actuators, sensors and machine vision.
4. Analyze the manipulator kinematics, dynamics for typical robots which will be used for complex operations and analyze the path planning for typical robots.
5. Choose a program that the robot can integrate with the manufacturing system to produce quality products with minimum cost with optimum usage of resources.

UNIT: I Introduction of AI 8 hours

Artificial Intelligence: Introduction to Artificial Intelligence (AI), History. AI techniques, LISP programming, AI and Robotics, LISP in the factory, sensoring and digitizing function in machine vision, image processing and analysis, training and vision system. Intelligent Agents: Agents and Environments, the Concept of Rationality, the Nature of Environments, the Structure of Agents.

UNIT: II Introduction to Robotics 12 hours

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: III Robot Actuators, Sensors and Machine Vision 12 hours

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.

Machine Vision: 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: IV Manipulator Kinematics and Trajectory Planning 16 hours

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: V Robot Applications and Programming 7 hours

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.

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.

Mapping of COs with POs & PSOs

COS	PO1	PO 2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3											3	3	2
CO-2	3					2						3	3	2
CO-3	3	3	3									3	3	2
CO-4	3	3	3	3								3	3	2
CO-5	3	3			3							3	3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH I-SEMESTER (Common to CSE [DS], CSE [AI&ML])

III B. TECH II-SEMESTER (CSE – Professional Elective – II)

L	T	P	C
3	0	0	3

20ACD08 SINGLE PAGE WEB APPLICATIONS WITH ANGULARJS

(Job Oriented Elective – I)

COURSE OUTCOMES:

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

- Explain the intermediate and advanced web development practices in JavaScript.
- Identify the features and functional components of React for Web Development.
- Find and use code packages of Node.js for creating cross-platform JavaScript runtime environment.
- Analyze different APIs and Server Rendering features for displaying information onto the screen.

UNIT I INTRODUCTION TO ANGULARJS 9

Introduction-Development Environment Setup - Model-View-View-Model [MVVM]- AngularJS installation - Sharing Data with the View - Implementing NameCalculator - Custom HTML Attributes - Dependency Injection - Protecting Dependency Injection from Minification - Expressions and Interpolation.

UNIT II 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 III PROMISES, AJAX AND CUSTOM DIRECTIVES 11

Asynchronous Behavior with Promises and $q - Ajax with $http Service - Ajax with $http Service - Directives: Dynamic HTML - Directives: Dynamic HTML - restrict Property - Directive’s Isolate Scope: “=” and “@” - Directive’s Isolate Scope: “=” and “@” - Using Controllers Inside Directives - Using Controllers Inside Directives - Directive APIs and “&” - Directive APIs and “&” - Manipulating the DOM with link - Manipulating the DOM with link- Using Directive’s transclude to Wrap Other Elements - Using Directive’s transclude to Wrap Other Elements.

UNIT IV COMPONENTS, EVENTS, MODULES, AND ROUTING 8

Components & Component-Based Architecture - AngularJS 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 V FORM VALIDATION AND TESTING 8

Form Validation-Testing Javascript with Jasmine- Testing AngularJS Controllers-Testing AngularJS Services and $http- Testing AngularJS Directives- Testing AngularJS Components-Testing AngularJS Components-Visit With The Client-Non-AngularJS 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: 45 Hrs

TEXT BOOK

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 .

REFERENCES

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 REFERENCE

- https://in.coursera.org/learn/single-page-web-apps-with-angularjs
- http://tutorialsteacher.com
- https://reactjs.org/
- https://nodejs.org
- www.Expressjs.com
- www.mongodb.com

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-								3	3
CO2	3	2	3	-	1							3	2
CO3	3	3	3	-	1							3	2
CO4	3	2	3	-	2							2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH I-SEMESTER (Common to CSE[DS] & CSE[AI&ML])

L	T	P	C
3	0	0	3

20ACD09 - DISTRIBUTED DATABASE AND INFORMATION SYSTEMS

(Job Oriented Elective – I)

COURSE OUTCOMES:

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

- Describe the concepts of distributed relational database and query processing.
- Summarize distributed security techniques and database recovery.
- Apply the appropriate protocols for symmetric and asymmetric cryptosystems.
- Analyze the functions and components of Information system.
- Analyze the decision support system and tools for Business operations.

UNIT 1 INTRODUCTORY 9 Hrs.

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 Hrs.

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 10Hrs

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 - Tradeoffs between table storage and route lengths - Graph structures of complex networks - Internet graphs - Generalized random graph networks.

UNIT 4 FUNDAMENTALAS OF INFORMATION SYSTEMS 8 Hrs.

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 Hrs.

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=45Hrs

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.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	3	-	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO5	3	2	1	-	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
III B. Tech I Semester (Common to CSE, IT, CSE (DS), CSE (AI & ML))

L	T	P	C
0	0	3	1.5

20ACS25 - WEB TECHNOLOGIES LAB

Course Outcomes:

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

1. Design web pages using HTML and CSS.
2. Create dynamic webpage by applying server and server-side scripting languages
3. Apply database connectivity for storing and retrieving data from database through Web page

LIST OF EXPERIMENTS

Week 1:

1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.

Week 2:

2. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.

Week 3:

3. Write a JavaScript code that displays text TEXT-GROWING with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays TEXTSHRINKING in BLUE color. Then the font size decreases to 5pt.

Week 4:

4. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems:

   1. Parameter: A string
   2. Output: The position in the string of the left-most vowel
   3. Parameter: A number
   4. Output: The number with its digits in the reverse order

Week 5:

5. Design an XML document to store information about a student in SVCET College. The information must include USN, Name, and Name of the College, Programme, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

Week 6:

6. Write a PHP program to keep track of the number of visitors visiting the web page and to display

this count of visitors, with proper headings.

Week 7:

7. Write a PHP program to display a digital clock which displays the current time of the server.

Week 8:

8. Write the PHP programs to do the following:

   1. Implement simple calculator operations.
   2. Find the transpose of a matrix.
   3. Multiplication of two matrices.
   4. Addition of two matrices.

Week 9:

9. Write a PHP program named states.py that declares a variable states with value "Mississippi Alabama Texas Massachusetts Kansas". Write a PHP program that does the following:

   1. Search for a word in variable states that ends in xas. Store this word in element 0 of a list named states List.
   2. Search for a word in states that begins with k and ends in
   3. Perform a case-insensitive comparison. [Note: Passing re.Ias a second parameter to method compile performs a case-insensitive comparison.] Store this word in element1 of statesList.
   4. Search for a word in states that begins with M and ends in
   5. Store this word in element 2 of the list.
   6. Search for a word in states that ends in
   7. Store this word in element 3 of the list.

Week 10:

10. Write a PHP program to sort the student records which are stored in the database using selection sort.

Week 11:

11. Case Study Schemas (i.e., the tables and their relationships)

    1. Travel Photo Sharing Database
    2. Art database schema
    3. Book CRM Database

Week 12:

12. Case studies: - Practice sessions on Node.js and AngularJS.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	-	-	-	-	-	-	-	-	-	3	2	-
C02	3	2	-		3	1	1	-	-	3	-	3	2	-
C03	3	3	3	-	-	-	1	-	-	-	-	-	2	-

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. Tech I Semester (Common to CSE, IT, CSE (DS), CSE (AI & ML))
20ACS26 - COMPUTER NETWORKS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

1. Implement various routing protocols from different layers.
2. Design, implement and test an efficient algorithmic solution for the give problem
3. Use Network programming concepts in distributed applications.
4. Analyze different networking protocols and its modeling concepts to evaluate network performances.

LIST OF EXPERIMENTS

1. Implementation of the Data Link Layer Framing methods Character Stuffing and Bit stuffing.
2. Implementation of CRC polynomials, CRC 12, CRC 16 and CRC CCIP.
3. Implementation of Sliding Window Protocol Select Repeat ARQ.
4. Implementation of Dijkstra's algorithm for Shortest Path.
5. Implementation Link State routing algorithm.
6. Program to obtain Routing table for each node using the Distance Vector Routing algorithm of a given subnet.
7. Implementation of encryption & decryption using DES algorithm.
8. Implementation of encryption & decryption mechanisms using RSA algorithm.
9. Design and Analyze the performance of transmission control protocol in different scenario
10. Design and analyze the performance of a set of local area networks interconnected by switches and hub.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	-	-	1
C02	3	3	1	1	-	-	-	-	-	-	-	-	3	3
C03	3	3	3	3	1	-	-	-	-	-	-	2	3	2
C04	-	-	2	2	1	-	-	-	-	-	-	2	3	-

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech I Semester (EEE, CSE, IT, CSE (DS) & CSE (AI & ML)
III B. Tech II Semester (CE, ME, & ECE)

L	T	P	C
1	0	2	2

20AHS16 - ADVANCED ENGLISH COMMUNICATION SKILLS LAB
(Skill Course)

Course Outcomes:

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

CO1: Develop language fluency through conversational practices and demonstrate appropriate body language during communication.

CO2: Interpret and apply synonyms, antonyms, one-word substitutes, prefixes and suffixes to develop vocabulary to comprehend oral and written communication.

CO3: Analyze reading and writing techniques in preparing letters, resumes and technical reports by examining and applying guessing meaning, scanning, skimming and interfering meaning.

CO4: Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying skills in Oral presentations, Interviews and Group Discussions.

UNIT – 1

INTER-PERSONAL COMMUNICATION AND BUILDING VOCABULARY – Starting a conversation, Responding appropriately and relevantly, Using appropriate Body language, Role play in Different situations, Synonyms and antonyms, One-word substitutes, Prefixes and suffixes, Idioms & Phrases and Collocations.

UNIT - 2

READING COMPREHENSION – General vs. Local Comprehension, Reading for Facts, Guessing meanings from Context, Skimming, Scanning and inferring meaning.

UNIT - 3

WRITING SKILLS – Structures and Presentation of different types of writing – Letter writing, Resume writing, e-correspondence and Technical report writing.

UNIT - 4

PRESENTATION SKILLS – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/e-mails/Assignments, etc.

UNIT - 5

GROUP DISCUSSION AND INTERVIEW SKILLS – Dynamics of Group discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and organization of ideas and rubrics of evaluation, Concept and Process of interviews, Pre-interview planning, opening strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

Suggested Software:

- Sky Pronunciation
- Pro-power 2
- Globarena Software

References:

1. Kumar Sanjay, Pushpa Lata. *English for Effective Communication*, Oxford University Press, 2015.

2. Konar Nira**,** *English Language Laboratories – A Comprehensive Manual*, PHI Learning Pvt. Ltd., 2011.

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO1 1**	**PO12**	**PSO1**	**PSO2**
CO1	2	-	-	-	-	2	-	-	-	3	-	-	1	2
CO2	3	3	-	-	-	-	-	-	-	3	-	-	2	
CO3	2	2	-	-	-	-	-	-	-	3	-	-		2
CO4	2	-	-	-	-	-	-	-	3	3	-	-	1	1

Correlation Levels: 3 - High Mapping 2 - Medium Mapping 1 - Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

III B. Tech I Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI & ML))
III B. Tech I Semester (CE, ME, & ECE)

20AHS21 - INDIAN CONSTITUTION
(Mandatory Course)

L	T	P	C
2	0	0	0

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

1. Demonstrate the historical background of the constitution making and its importance for building democratic India.
2. Understanding the importance of Preamble of the Indian Constitution and Parliamentary Structure.
3. Analyse decentralization of power among central, state and local self-government.
4. Examine functioning of judiciary system, fundamental rights and duties of all India Services and international institutions.

UNIT: I Preamble and its Philosophy 10 hours
Introduction to Indian Constitution, Evolution of Indian Constitution, preamble and its philosophy.

UNIT: II Union Legislature 10 hours
The Parliament, Parliamentary Structure, Process of Legislation, President of India - Powers and Functions; Prime Minister and Council of Ministers; Constitution Amendment Procedure.

UNIT: III Federalism in India 10 hours
Centre-State Administrative Relationship; Governors - Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions; The Election Commission - Powers and Functions.

UNIT: IV Judiciary and Public Services 10 hours
The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services -State Services - Local Services.

UNIT: V International Participation 10 hours
Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP - India’s Role in International Negotiations; Environmentalism in India.

Textbooks

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005.

Reference Books

2. Mahendra Pal Singh, V. N. Shukla, Constitution of India, Eastern Book Company, 2011.
3. J. N. Pandey, Constitutional Law of India - Central Law Agency, 1998

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	3	2	-	-	-	-	-	2	2
CO2	-	-	-	-	-	3	3	-	-	-	-	-	2	1
CO3	-	-	-	-	-	3	3	-	-	-	-	-	2	1
CO4	-	-	-	-	-	3	2	3	-	-	-	-	2	1

Correlation Levels: 3 – High 2 - Medium 1 – Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS17 - QUANTITATIVE APLITUDE AND REASONING III
(Audit Course)

Course Outcomes:

After completion of the course the student will be able to

1. **Develop** the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. **Solve** campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. **Apply** different placement practice techniques.

UNIT 1: QUANTITATIVE ABILITY V

Time and Work – Equal Efficiency – Different Efficiency – Combined work – Alternate work – Partial work – Negative work - Pipes and Cistern – Simple Interest – Compound Interest - Year Zero – Difference between SI and CI – Clocks – Angle of the Clock –Minutes hand Loss or Gain – Calendars – Leap Year – Non-Leap year – Odd days – Days of the week

UNIT 2: QUANTITATIVE ABILITY VI

Mensuration 2D – Area and Perimeter - Mensuration 3D – Volume - Total Surface area – Lateral Surface Area – Statistics- Mean - Mean Deviation – Median – Mode - Range – Variance – Standard Deviation - Set theory

UNIT 3: REASONING ABILITY III

Puzzles – Cubes & Dices – Algebra – Selection Decision table – Visual reasoning - Inequalities

UNIT 4: VERBAL III

Vocabulary - Synonyms, Antonyms, One Word Substitution, and Spelling - Sentence Correction - Sentence Selection, Error Identification, Sentence Improvement, Sentence completion – Cloze Test, Types, Strategies - Para jumbles- Types, Strategies.

UNIT 5: SOFT SKILLS III

Written Communication - Listening Skills - Mentoring & Coaching - Decision Making - Competitiveness - Inspiring & Motivating.

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	1
CO3	2	-	-	-	-	-	-	-	-	-	-	-	1	1

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
III B. Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS18 - FRENCH LANGUAGE
(Audit Course)

COURSE OUTCOMES:
After completion of the course the student will be able to:
CO1: Demonstrate basic knowledge of French language and analyze several core competencies.
CO2: Develop and improve comprehensive capabilities and apply simple phrases & sentences in real-life conversation.
CO3: Demonstrate ability to ask and answer questions about the self, personal interest, everyday life, and the immediate environment.
CO4: Apply the knowledge of tenses in making sentences for day-to-day conversations in different time frame.

UNIT-1 INTRODUCTION & PRESENTATION:
Conversation, Introduction, Alphabets & Accents Culture, Formal & Informal – Use of ‘tu’ and ‘vous’, Map of France: Geographical, Administrative Greeting, Presenting oneself & others, Asking & giving identity, Days of the week, Months of the year, Numbers, Nationality, Profession, Making a visiting card salutations, Gestures & Handshakes.
Grammar – Verb “appeller”, ‘avoir’, ‘etre’ and Pronouns.

UNIT-2 RENDEZVOUS:
Conversation, approaching someone, Tele conversation, Buying a train ticket, Numbers the formula to write a post card, Culture and Life in France.
Grammar – Passe Compose, Verbs “aller”, “partir”, “venir”, “prendre”, Definite & Indefinite Articles.

UNIT-3 AGENDA & INVITATION:
Conversation, Time, Fixing a meeting, Alimentation, Moments of the day (from morning to night), Punctuality, Good moments of the day, Inviting someone, Accepting & Refusing Invitations, Family tree, Describing a house interior.
Grammar – Verbs “savoir”, “vouloir” , “pouvoir”, Future Proche, Pronom Tonique Consists of exercises and images to be used in the class by the students, Pronoun ‘on’, Expression of quantity with partitif article, Possessive Adjectives and Verbs “finir”, “faire,”.

UNIT-4 VACATION & SHOPPING:
Describing an event, Reservations at a Hotel, Describing a person, Expressing opinion, Indication of time: Depuis & pendant, Gestures: Polite & Impolite, A French vacation,

Culture, Making a purchase, Choosing & Paying, Trying a dress on, Talking about weather, Understanding a Weather Bulletin, Comparison, Dress & weather, Dialogue between a client and an employee of a store and Money in everyday life in France: Parking ticket / telephone card.Grammar – Imparfait & Passe Compose and Adjectives.

UNIT-5 ITINERARY, EXCURSION & WEEKEND:

Asking for & giving directions, Giving order / advice / prohibition, Reservation at a restaurant, Taking an order, Asking for bill at a Restaurant, Expression of Quantity, Alimentation: Shopping list (portions), Making Suggestion & Proposal, Going for an outing, Acceptance & Refusal of an invitation, Giving arguments: favour & against, A French Weekend.

Grammar – Ordinal Verbs of Movement.

Text Books:

1. CAMPUS 1 Methode de Francais, Jacques Pecheur et Jacky Girardet, CLE International Paris 2002.
2. La France de toujours, Nelly Mauchamp; CLE international.
3. Sans Frontireres - Vols. 1, 2, & 3 – Hachette.

Reference Books:

1. Declic 1; Jacques Balnc, Jean-Michel Cartier, Pierre Lederlion; CLE International.
2. Nouveau Sans Frontieres – Vols. 1, 2 & 3.
3. Cours de langue et de civilisation Francaise – Hachette.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	3	3	-	-	2	1
CO2	2	-	-	-	-	-	-	-	3	3	-	-	2	1
CO3	2	-	-	-	-	-	-	-	3	3	-	-	1	1
CO4	2	-	-	-	-	-	-	-	3	3	-	-	1	1

Correlation Levels: **3 - High 2 - Medium 1 - Low**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS19 - GERMAN LANGUAGE
(Audit Course)

COURSE OUTCOMES:

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

CO1: Demonstrate fundamental knowledge to learn German language, sounds, pronunciations, sentence structures and the verb conjugation.

CO2: Comprehend and apply the knowledge of vocabulary and phrases in day-to-day real-life conversation.

CO3: Apply various sentence structures by examining the rules of grammar in speaking and writing.

CO4: Analyze and apply the various verb structures of English and German language effectively in professional writing.

UNIT-1 GERMAN SOUNDS

Vowels, consonants, diphthongs, umlaut, the nouns, gender distinctions, cases, definite and indefinite articles, conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs, personal pronouns, possessive pronouns, reflexive pronouns, cases nominative, accusative and dative. Structure of sentence and categories of sentences, subordinate clause, causative and conditional sentences; A very interesting slideshow presentation is held to enlighten the students about the culture, people, and lifestyle in Germany.

UNIT-2 SENTENCE FORMATION

Infinite sentences, use of conjunctive-I and conjunctive-II, plusquam perfect, modal verb, Conjunction, temporal, subordinate clauses & complex sentences.

UNIT-3 GERMAN BASIC GRAMMAR

Verbs: Different forms, past tense and present perfect tense, adjectives and their declension, degrees of comparison; Prepositions, genitive case conjunctive. Different conjunctions (coordinating and subordinating), simple, complex and compound sentences, active and passive voice, relative pronouns.

UNIT-4 PURPOSE OF LANGUAGE STUDY

Pictures and perceptions, conflicts and solutions, change and the future, the purpose of the study of the German language, listening, understanding, reacting, speaking, communicating, use of language, pronunciation and intonation, reading, reading and understanding, writing, text writing, text forming, use of language, language reflection, building up the language, language comparison, culture reflection, other cultures and cultural identity.

UNIT-5 GERMAN ADVANCED COMMUNICATION LEVEL - 1

The significance of language study, Speaking and thinking, Self – discovery, Communication, Language Competence, Language and culture, Language changes, Connection with other areas of study, The mother language and the other languages.

TEXT BOOKS:

1. Korbinian, Lorenz Nieder Deutschals Fremdsprache IA. usländer,

"German Language", Perfect Paperback Publishers, 1st Edition, 1992.

2. Deutschals Fremdsprache, IB, Erganzungskurs, "German Language", Front Cover. Klett, Glossar Deutsch-Spanisch Publishers, 1st Edition, 1981.

REFERENCE BOOKS:

1. Griesbach, "Moderner Gebrauch der deutschen Sprache", Schulz Publishers, 10th Edition, 2011.
2. Anna Quick, Hermann Glaser U.A, "Intermediate German: A Grammar and workbook", Paperback, 1st Edition, 2006.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	-	-	-	3	-	-	2	1
CO2	2	-	-	-	-	-	-	-	-	3	-	-	2	1
CO3	3	-	-	-	-	2	-	-	-	3	-	-	1	1
CO4	2	-	-	-	-	-	-	-	-	3	-	-	1	1

Correlation Levels: 3 - High 2 - Medium 1 – Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS20 - JAPANESE LANGUAGE
(Audit course)

Course Outcomes:

CO1: Remember and understand Japanese alphabet and demonstrate basic structures of sentences in reading and writing.

CO2: Analyze the limitations of language by examining pronouns, verbs form, adjectives and conjunctions.

CO3: Demonstrate the skills of vocabulary and apply it to learn time and dates and express them in Japanese.

CO4: Analyze the formation of simple questions and answers in Japanese to know the Japanese culture and etiquette.

UNIT – 1

INTRODUCTION TO JAPANESE SYLLABLES AND GREETINGS – Introduction of Japanese language, alphabets; Hiragana, katakana, and Kanji Pronunciation, vowels and consonants. Hiragana – writing and reading; Vocabulary: 50 Nouns and 20 pronouns, Greetings.

UNIT – 2

DEMONSTRATIVE PRONOUNS, VERBS AND SENTENCE FORMATION - Grammar: N1 wa N2 desu, Japanese Numerals, Demonstrative pronoun - Kore, Sore, Are and Dore (This, That, Over there, which) Kono, sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochira. this way....) Koko, Soko, Asoko and Doko (Here, There,...location), Classification of verbs Be verb desu Present and Present negative Basic structure of sentence (Subject+ Object+ Verb) Katakana-reading and writing

UNIT - 3

CONJUNCTION, ADJECTIVES, VOCABULARY AND ITS MEANING - Conjunction-Ya…..nado Classification of Adjectives 'I' and 'na'-ending Set phrase – Onegaishimasu – Sumimasen, wakarimasen Particle –Wa, Particle-Ni 'Ga imasu' and 'Ga arimasu' for Existence of living things and non-living things Particle- Ka, Ni, Ga, Days/ Months /Year/Week (Current, Previous, Next, Next to Next); Nation, People and Language Relationship of family (look and learn); Simple kanji recognition.

UNIT - 4

FORMING QUESTIONS AND GIVING ANSWERS - Classification of Question words (Dare, Nani, Itsu, Doyatte, dooshite, Ikutsu, Ikura); Classification of Te forms, Polite form of verbs.

UNIT - 5

EXPRESSING TIME, POSITION AND DIRECTIONS – Classification of question words (Doko, Dore, Dono, Dochira); Time expressions (Jikan), Number of hours, Number of months, calendar of a month; Visiting the departmental store, railway stations, Hospital (Byoki), office and University.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	3	-	-	1	1
CO2	3	-	-	-	-	-	-	-	-	3	-	-	1	2
CO3	3	-	-	-	-	-	-	-	-	3	-	-	1	-
CO4	3	-	-	-	-	-	-	-	-	3	-	-	1	-

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
III B. TECH II-SEMESTER (Common to CSE(DS) and CSE (AIML))

L	T	P	C
3	0	0	3

20ACD11 - BIG DATA COMPUTING

Course Outcome

On completion of the course, student will be able to:

1. Explain fundamental characteristics and best practices of Big Data Analytics.
2. Define concept of Hadoop Ecosystem and its associated components in the Hadoop Framework.
3. Analyze the key features of Apache Spark in developing and executing Big Data Applications.
4. Analyze the essential characteristics of HBASE and Kafka.
5. Examine the algorithms for Big Data Applications.

UNIT – 1: INTRODUCTION TO BIG DATA 8

Introduction to Big Data: Big Data and Business case – Building the Big Data Team - Big Data Big Data Enabling Technologies: Sources-Nuts and Bolts of Big Data- Big Data Security - Compliance - auditing and protection-Evolution of Big Data-Best practices for Big Data Analytics-Big Data characteristics- Volume - Veracity - Velocity - Variety- Structure of Big Data.

UNIT - 2: HADOOP DISTRIBUTED FILE SYSTEM AND MAP REDUCE PROGRAMMING 10

Hadoop Stack for Big Data - Introduction to Hadoop- Hadoop Distributed File System (HDFS) - Hadoop MapReduce 1.0 - Hadoop MapReduce 2.0 -Advanced Features of Hadoop MapReduce 2.0 - MapReduce Examples.

UNIT – 3: BIG DATA ANALYTICS USING SPARK 9

Parallel Programming with Spark - Introduction to Spark- Spark Built-in Libraries
Design of Key-Value Stores - Data Placement Strategies - CAP Theorem- Consistency Solutions - Design of Zookeeper - CQL (Cassandra Query Language).

UNIT – 4: WORKING WITH HBASE, KAFKA AND BIG DATA MACHINE LEARNING 10

Design of HBase-Spark Streaming and Sliding Window Analytics - Sliding Window Analytics-Introduction to Kafka.
Big Data Machine Learning - Machine Learning Algorithm- K-means using Map Reduce for Big Data Analytics-Parallel K-means using Map Reduce on Big Data Cluster Analysis

UNIT – 5: ALGORITHMS FOR BIG DATA ANALYTICS 8

Decision Trees for Big Data Analytics - Big Data Predictive Analytics - Parameter Servers - PageRank Algorithm in Big Data - Spark GraphX & Graph Analytics. Case Study: Flight Data Analysis using Spark GraphX

Total: 45 Hrs

Text Books:

1. Ohlhorst, Frank J. Big data analytics: turning big data into big money. Vol. 65. John Wiley & Sons, 2012.
2. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
3. Guller, Mohammed. Big data analytics with Spark: A practitioner's guide to using Spark for large scale data analysis. Apress, 2015.

Reference Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
3. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley &Sons, 2012.

Web References:

1. https://archive.nptel.ac.in/courses/106/104/106104189/
2. https://hadoop.apache.org/docs/
3. https://spark.apache.org/docs/

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	2	-	2	-	-	-	-	-	-	-	3	2
CO3	3	2	2	2	-	-	-	-	-	-	-	-	2	2
CO4	3	2	1	-	2	-	-	-	-	-	-	-	2	2
CO5	2	2	1	-	2	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM07 - INTRODUCTION TO MACHINE LEARNING

COURSE OUTCOMES

On completion of the course the student will be able to

1. Explain fundamentals of Machine learning algorithms and principles.
2. Describe the concept of Neural networks and multi-layer perceptron to recognize the data patterns.
3. Apply dimensionality reduction and probabilistic learning for improving model efficiency.
4. Analyze vector machine to perform binary classification.
5. Analyze Tree based learning for handling classification and regression problems.

UNIT - 1: INTRODUCTION 10

Introduction to Machine Learning - Logistic Regression - Interpretation of Logistic Regression- Motivation for Multilayer Perceptron- Multilayer Perceptron Concepts - Multilayer Perceptron Math Model- Deep Learning - Example: Document Analysis- Interpretation of Multilayer Perceptron- Transfer Learning - Model Selection- Early History of Neural Networks- Hierarchical Structure of Images- Convolution Filters- Convolutional Neural Network - CNN Math Model- How the Model Learns- Advantages of Hierarchical Features- CNN on Real Images-Applications in Use and Practice.

UNIT – 2: BASICS OF MODEL LEARNING 8

Deep Learning and Transfer Learning- Introduction to PyTorch - Basics of Learning - Evaluate Our Networks- Learn Our Network- Handling Big Data- Early Stopping- Model Learning with PyTorch.

UNIT–3: IMAGE ANALYSIS WITH CONVOLUTIONAL NEURAL NETWORKS 9

Breakdown of the Convolution - Core Components of the Convolutional Layer- Activation Functions- Pooling and Fully Connected Layers- Training the Network- Transfer Learning and Fine-Tuning - Motivation: Diabetic Retinopathy.

UNIT – 4: 10
RECURRENT NEURAL NETWORKS FOR NATURAL LANGUAGE PROCESSING

Introduction to the Concept of Word Vectors- Words to Vectors- Example of Word Embeddings- Neural Model of Text- The Softmax Function- Methods for Learning Model Parameters- More Details on How to Learn Model Parameters- The Recurrent Neural Network- Long Short-Term Memory- Long Short-Term Memory Review- Use of LSTM for Text Synthesis- Simple and Effective Alternative Methods for Neural NLP- Natural Language Processing with PyTorch.

THE TRANSFORMER NETWORK FOR NATURAL LANGUAGE PROCESSING
Word Vectors and Their Interpretation- Relationships Between Word Vectors- Inner Products Between Word Vectors- Intuition Into Meaning of Inner- Products of Word Vectors- Introduction of Attention Mechanism- Queries, Keys, and Values of Attention Network- Self-Attention and Positional Encodings- Attention-Based Sequence Encoder- Coupling the Sequence Encoder and Decoder- Cross Attention in the Sequence-to-Sequence Model- Multi-Head Attention- The Complete Transformer Network.

UNIT – 5: REINFORCEMENT LEARNING 8
Introduction to Reinforcement Learning- Reinforcement Learning Problem Setup- Example of Reinforcement Learning in Practice- Reinforcement Learning with PyTorch- Moving to a Non-Myopic Policy- Q Learning- Extensions of Q Learning- Limitations of Q Learning, and Introduction to Deep Q Learning- Deep Q Learning Based on Images- Connecting Deep Q Learning with Conventional Q Learning.

TEXT BOOKS

1. Machine Learning- An Algorithmic Perspective", 2/e, 2014, Stephen arsland, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series.
2. "Pattern Recognition and Machine Learning", 2007, Christopher Bishop, Springer.

REFERENCE BOOKS

1. "Machine Learning: A Probabilistic Perspective", 2012, Kevin P. Murphy, MIT Press.
2. "Introduction to Machine Learning", MIT Press, 3/e, 2014, Ethem Alpaydin.
3. "Machine Learning", 1997, Tom Mitchell, McGraw-Hill.

Web References

1. https://www.coursera.org/learn/machine-learning-duke.
2. https://machinelearningmastery.com/stacking-ensemble-machine-learning-with-python/
3. https://sebastianraschka.com/blog/2018/model-evaluation-selection-part4.html

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	2	-	2	-	-	-	-	-	-	-	3	2
CO3	3	2	2	2	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	1	2	-	-	-	-	-	-	-	2	2
CO5	2	2	2	-	2	-	-	-	-	-	-	-	2	2

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))
IV B. Tech I Semester (IT – Professional Elective IV)

L	T	P	C
3	0	0	3

20ACM08 - DEEP LEARNING

COURSE OUTCOMES:

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

1. Explain the basics of deep neural networks.
2. Use Convolution Neural Network for image processing.
3. Apply deep learning algorithms for data science
4. Apply deep learning algorithms for variety applications

UNIT I DEEP NETWORKS BASICS 9

Linear Algebra: Scalars - Vectors - Matrices and tensors; Probability Distributions - Gradient based Optimization – Machine Learning Basics: Capacity - Overfitting and underfitting - Hyperparameters and validation sets - Estimators - Bias and variance - Stochastic gradient descent - Challenges -motivating deep learning; Deep Networks: Deep feedforward networks; Regularization - Optimization.

UNIT II CONVOLUTIONAL NEURAL NETWORKS 9

Convolution Operation - Sparse Interactions - Parameter Sharing - Equivariance - Pooling - Convolution Variants: Strided - Tiled - Transposed and dilated convolutions; CNN Learning: Nonlinearity Functions - Loss Functions - Regularization - Optimizers - Gradient Computation.

UNIT III DEEP LEARNING ALGORITHMS FOR AI 9

Artificial Neural Networks - Linear Associative Networks – Perceptron's -The Backpropagation
Algorithm - Hopfield Nets - Boltzmann Machines - Deep RBMs - Variational Autoencoders - Deep Backprop Networks- Autoencoders

UNIT IV DATA SCIENCE AND DEEP LEARNING 9

Data science fundamentals and responsibilities of a data scientist - life cycle of data science – Data science tools - Data modeling, and featurization - How to work with data variables and data science tools - How to visualize the data - How to work with machine learning algorithms and Artificial Neural Networks

UNIT V APPLICATIONS OF DEEP LEARNING 9

Detection in chest X-ray images -object detection and classification -RGB and depth image fusion -NLP tasks - dimensionality estimation - time series forecasting -building electric power grid for controllable energy resources - guiding charities in maximizing donations and robotic control in industrial environments.

TOTAL:45 PERIODS

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, ``Deep Learning", MIT Press, 2016

2. Stone, James. (2019). Artificial Intelligence Engines: A Tutorial Introduction to the
Mathematics of Deep Learning, Sebtel Press, United States, 2019
3. Vance, William , Data Science: A Comprehensive Beginners Guide to Learn the Realms of Data Science (Hardcover - 2020), Joiningthedotstv Limited.

REFERENCE BOOKS:

1. Wani, M.A., Raj, B., Luo, F., Dou, D. (Eds.), Deep Learning Applications, Volume 3,Springer Publications 2022
2. Charu C. Aggarwal, ``Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 2018.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2									2	2
CO2	3	2	1	2								2	2
CO3	3	3	2	1								2	3
CO4	3	1	1									3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II -SEMESTER (Common to IT and CSE[DS], CSE[AIML]

L	T	P	C
3	0	0	3

20AIT13 - SOFTWARE PROJECT MANAGEMENT
(Professional Elective -II)

COURSE OUTCOMES:

CO1: Implement a project to manage project schedule, expenses and resources of application.

CO2: Obtain adequate knowledge about software process models and software effort estimation techniques.

CO3: Design and develop project plans to address real-world management challenges.

CO4: Aware of project management theories, tools, techniques and methods to manage the software projects at each stage of software development life cycle.

CO5: Understand modern software project management principles as a member and leader in a team to manage the projects.

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Manage your people – Managing project culture – Managing good people – Making good people- better – Leading good people – Implement your process – Putting a process in implementing a process – Adopting an agile process – Assessing a process – Leverage your tools – Choosing tools –Training to use tools – Leveraging tools – Use your measurements – Selecting measurements –Planning measurement – Leveraging measurement.

UNIT II PROJECT LIFE CYCLE ANDEFFORTESTIMATION

Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT III ARTIFACTS OF THE PROCESS AND MODEL BASED SOFTWAREARCHITECTURES

The artifact sets - Management artifacts - Engineering artifacts - Programmatic artifacts – Model based software architectures - A management perspective and technical perspective - Workflows of the process - Software process workflows - Iteration workflows – Check points of the process – Major milestones - Minor milestones - Periodic status assessments.

UNIT IV ITERATIVE PROCESS PLANNING- PROJECT ORGANIZATIONS AND RESPONSIBILITIES

Work breaks down structures - Planning guidelines – The cost and schedule estimating process – The iteration planning process - Pragmatic planning -Line of business organizations - Project organizations – Evolution of organizations – Process Automation-Automation building blocks-The project environment.

UNIT V PROJECT CONTROL AND PROCESSINSTRUMENTATION

The seven-core metrics - Management indicators - Quality indicators - Life cycle expectations -pragmatic software metrics - Metrics automation - Tailoring the process - Process Discriminates-Example.

TEXT BOOKS:

1. Software Project Management, 1/e, Walker Rayce, 1998, PEA, NewDelhi.
2. Software Project Management, 2/e, Henrey, 2009, Pearson Education, NewDelhi.

REFERENCE BOOKS:

1. Software Engineering Project Management, 2/e, Richard H. Thayer,1997, IEEE Computer Society, US.
2. Software Engineering and Management, 2/e, Shere K. D 1998, PHI, NewDelhi.
3. Software Project Management: A Concise Study, 2/e, S. A. Kelkar ,2009, PHI, NewDelhi.
4. Software Project Management, 5/e, Hughes Cotterell, 2011, TMH,India.
5. Software Project Management, 1/e, Mohapatra S 2011, Penguin Books Ltd, London,UK.

CO-PO Mapping

CO \ PO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	2	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	3
CO4	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II-SEMESTER (Common CSE[DS] and CSE[AIML])

L	T	P	C
3	0	0	3

20ACD15 - KNOWLEDGE MANAGEMENT
(Professional Elective -II)

COURSE OUTCOMES

On completion of the course the student will be able to

1. Explain the concept of knowledge and its types.
2. Identify the challenges in building Knowledge Management systems.
3. Apply Knowledge capturing techniques and coding tools for development of knowledge systems.
4. Analyze the Knowledge transfer methods and management protocols.

UNIT 1 KNOWLEDGE MANAGEMENT 9

KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence –Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT 2 KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE 9

Challenges in Building KM Systems – Conventional Vrs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT 3 CAPTURING KNOWLEDGE 9

Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid-Concept Mapping–Blackboarding.

UNIT 4 KNOWLEDGE CODIFICATION 9

Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing –Approaches to Logical Testing, User AcceptanceTesting–KMSystemDeploymentIssues–UserTraining–Postimplementation.

UNIT 5 KNOWLEDGE TRANSFER AND SHARING 9

Transfer Methods – Role of the Internet – Knowledge Transfer in e- world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing Knowledge Workers.

Total- 45 Hrs.

TEXT /REFERENCE BOOKS

1. Elias.M. Award & Hassan M. Ghaziri – "Knowledge Management" Pearson Education 2000

2. Guus Schreiber, Hans Akkermans, AnjoAnjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
3. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003
4. Becerra-Fernandez, I.; Sabherwal, R.: Knowledge Management: Systems and Processes. M.E. Sharpe Inc.,2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	1									3	
CO2	3	2	1									3	2
CO3	3	3	2									2	3
CO4	3	3	2									2	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM09 - AI AND ROBOTICS PROGRAMMING
(Professional Elective – II)

COURSE OUTCOMES

1. Explain concepts of robot programming and the types of robot coordinate systems and programming functions.
2. Apply the design principles of robot programs with WAIT, SIGNAL and DELAY commands.
3. Apply various programming features of robot language for communication and data processing.
4. Analyze the command inputs for interlock functions and sensor feedbacks in the robot programs.

UNIT1 INTRODUCTION TO ROBOT PROGRAMMING 9hrs

Robot software functions – coordinate systems - position control, other control functions, subroutines, Program planning for Robot flow charting for robot programs with few examples.

UNIT2 METHODS OF ROBOT PROGRAMMING 9hrs

Online programming, off-line programming, advantages of off-line programming, lead through methods - powered lead through, manual lead through, teach pendant, Robot program as a path in space, defining position in space, motion interpolation, WAIT, SIGNAL and DELAY commands, Branching capabilities and Limitations of head through methods.

UNIT3 ROBOT LANGUAGES 10hrs

Textual ROBOT Languages, first generation and second-generation languages, structure of a robot language – operating systems, Elements and Functions, constants, variables and other data objects, Motion commands, points in workspace, End effector and sensor commands, computations and operations, program control and subroutines, communications and Data processing.

UNIT4 A MANUFACTURING LANGUAGE IN ROBOTICS 9hrs

General description, AML statements, Constant and variables, program control statements, motion commands, Sensor commands, Grip sensing capabilities, Data processing, examples

UNIT5 AI AND ROBOTICS PROGRAMMING USING PYTHON 8hrs

Applying AI to Chefbot – Block Diagram of Communication System in Chefbot- Introduction To AIML- PyAIML- Working AIML and Python- Integrating PyAIM into ROS

Total: 45 Hrs

TEXT BOOKS

1. Cameron Hughes and Tracey Hughes, Robot Programming, Pearson education, 2016.

2. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, 'Industrial Robotics Technology, Programming and Applications', Mc Graw Hill Book company, 1986.
3. Joseph, Lentin. learning Robotics using python. Packt Publishing Ltd, 2015.

REFERENCE BOOKS

1. Bernard Hodges, 'Industrial Robotics', Second Edition, Jaico Publishing House, 1993.
2. Lentin Joseph, 'Learning Robotics using Python', 2nd Edition, 2018.

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	2
CO3	3	2	2	-	2	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	2	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM10 - VIRTUAL AND AUGMENTED REALITY
(Professional Elective -II)

COURSE OUTCOMES

On completion of the course, the student will be able to

1. Explain fundamental of Virtual Reality and its basic features.
2. Analyze the concept of Multiple Modals of I/O Interface, Interactive Techniques and frameworks in VR
3. Use Development Tools and Frameworks for creating simulated environments
4. Recognize the technologies used to manage the large-scale VR environment in real time applications.

UNIT 1 FUNDAMENTALS OF VIRTUAL REALITY 9

Fundamental Concept and Components of Virtual Reality- Primary Features and Present Development on Virtual Reality – VR systems - VR as a discipline-Basic features of VR systems-Architecture of VR systems-VR hardware -VR input hardware: tracking systems, motion capture systems, data gloves-VR output hardware: visual displays.

UNIT 2 I/O INTERFACE AND INTERACTIVE TECHNIQUES IN VIRTUAL REALITY 9

Multiple Modals of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video based Input, 3D Menus & 3DScanner etc. Output- Visual / Auditory / Haptic Devices. Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp.

UNIT 3 GRAPHICS, DEVELOPMENT TOOLS AND FRAMEWORKS IN VIRTUAL REALITY 9

Fundamentals of Computer Graphics-Software and Hardware Technology on Stereoscopic Display-Advanced Techniques in CG: Management of Large-Scale Environments & Real Time Rendering -Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtoolsetc

UNIT 4 FUNDAMENTAL OF AUGMENTED REALITY 9

System Structure of Augmented Reality-Key Technology in AR-- AR software development - AR software. Camera parameters and camera calibration, Marker-based augmented reality, Pattern recognition, AR Toolkit

UNIT 5 APPLICATIONS OF VIRTUAL REALITY 9

VR Technology in Film & TV Production VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.3D user interfaces - Why 3D user interfaces. Major user tasks in VE. Interaction techniques for selection, manipulation and navigation.3DUI evaluation.

Total- 45 Hrs.

TEXT / REFERENCE BOOKS

1. Sherman, William R. and Alan B. Craig. Understanding Virtual Reality – Interface, Application, and Design, Morgan Kaufmann, 2002.
2. Fei GAO. Design and Development of Virtual Reality Application System, Tsinghua Press, March 2012.
3. Guangran LIU. Virtual Reality Technology, Tsinghua Press, Jan. 2011.
4. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-							3	3
CO2	3	2	2	-	-							3	2
CO3	3	3	3	-	-							3	2
CO4	3	2	3	-	-							3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM11 - BIO INSPIRED COMPUTING
(Professional Elective -II)

Course Outcome:

On completion of the course, the student will be able to

1. Define 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 of swarm intelligence for collective behavior, decentralized and self-organized systems.

UNIT I – INTRODUCTION 9hrs

Life and Information - The Logical Mechanisms of Life - What is 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 II - COMPLEX SYSTEMS & ARTIFICIAL LIFE 9hrs

Complex Systems and Artificial Life - Complex Networks - Self-Organization and Emergent Complex Behaviour - Cellular Automata - Boolean Networks -Development and Morphogenesis - Open-ended evolution

UNIT III - NATURAL COMPUTATION AND NEURAL NETWORKS 9hrs

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 IV - EVOLUTIONARY SYSTEMS AND ALGORITHMS (9 hours)

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 V - SWARM INTELLIGENCE 9hrs

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

TEXTBOOKS

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.

WEB REFERENCES

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:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	3	2
CO2	3	2	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	3	1	-	-	-	-	-	-	-	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. TECH II-SEMESTER

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

L	T	P	C
3	0	0	3

20AEC45 - MICROPROCESSOR AND INTERFACING

(Open Elective – II)

Course Outcomes:

After Successful completion of the course the student will be able to:

CO1: Understand the architecture of microprocessors

CO2: Write the Various ALP's of microprocessors

CO3: Design Interfacing of different external peripheral devices with microprocessors and micro controllers

CO4: Develop VLSI, Embedded systems, Industrial and real time application.

UNIT I 8086 MICROPROCESSORS

Evolution of microprocessors, memory segmentation,8086 Architecture, register organization, Flag Register, Pin Diagram of 8086- Minimum and Maximum mode 8086 systems, Timing Diagrams for Memory Read (MR), Memory Write (MW), IO Read (IOR) and IO Write (IOW) bus cycles.

UNIT II INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086

Addressing Modes-Instruction Set, Assembler Directives-Macros and procedures, assembly language programs for addition, subtraction, multiplication, division, GCD and LCM of two numbers, Evaluation of arithmetic expressions, largest and smallest numbers in an array, sorting an array, searching for a number in an array, programs using lookup tables.

UNIT-III INTERFACING WITH ADVANCED DEVICES

8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control).

INTERFACING I/O PORTS AND APPLICATIONS

Keyboard display controller (8279) and interfacing to 8086, PPI 8255 – various modes of operation and interfacing to 8086, Stepper Motor interfacing, D/A &A/D converter, traffic light controller

UNIT-IV ADVANCED MICROPROCESSORS

Introduction to 80286, Salient Features of 80386, Real and Protected Mode Segmentation & Paging, Salient Features of Pentium, Branch Prediction and Overview of RISC Processors

UNIT V INTRODUCTION TO MICROCONTROLLERS

overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051, Simple programs.

TEXT BOOKS:

1. Advanced Microprocessor and Peripherals, A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Micro Controllers, Deshmukh, Tata McGraw Hill Edition,2005.

REFERENCE BOOKS:

1. Micro Processors & Interfacing, Douglas V. Hall, 2007.
2. The 8088 and 8086 Micro Processors Walter, A.Triebel & Avtar Singh, 4th Edition – PHI, 2003.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design, Liu and G.A. Gibson, 2nd Edition, PHI, 1987.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	3	3
CO2	3	3	3	3								3	3	3
CO3	3	3	3	3								3	3	3
CO4	3	3	3	3	3							3	3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. Tech II Semester (Common to CSE, CSE[DS], CSE[AIML], CE, ME & IT)

L	T	P	C
3	0	0	3

20AME31 - OPERATION RESEARCH
(Open Elective – II)

Course Outcome:

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

1. Summarize various LPP, TPP, AP, sequencing, replacement, game theory, project management, queuing models of operations Research.
2. Illustrate the application of OR models to identify solutions to industry.
3. Identify the optimum solutions with system approach to both industry and service sector.
4. Judge the advanced software tools for decision making with available sources for cost reduction and profit maximization with society concern.
5. Develop a team and play a key role in decision making with interpretation skills for all round development of organization

UNIT: I INTRODUCTION AND LINER PROGRAMMING 12 Hours

Development – definition – characteristics and phases – types of Operations Research models – applications – limitations.

Linear Programming and its Applications: Linear Programming Problem – Graphical solution of LP Problems. Simplex method – artificial variables techniques - Two phase method, - Big M method

UNIT: II TRANSPORTATION AND ASSIGNMENT PROBLEMS 12 Hours

Transportation: Introduction – Methods of basic feasible solution, Optimality test, Degeneracy in transportation problem, unbalanced transportation Problem, -- Assignment problem – Introduction – un balanced model -- optimal solution – Hungarian method, - un-balanced assignment problems- travelling salesman problem.

UNIT: III REPLACEMENT AND WAITING LINE PROBLEMS 12 Hours

Replacement: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement, Waiting lines: Introduction, single channel Poisson arrival, exponential service time with finite population and infinite population.

UNIT: IV SIMULATION AND THEORY OF GAMES 12 Hours

Simulation Definition – types of simulation models – phases of simulation – application of simulation – inventory and queuing problems – merits and demerits -- simulation languages. Theory of Games: Introduction – mini, max (max, mini) – criterion and optimal strategy-- to solve the rectangular two-person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two-person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.

UNIT: V NETWORK MODELS AND PROJECT MANAGEMENT 12 Hours

Network models - Introduction, Rules for construction and errors. Shortest route - Dijkstra's algorithm, Minimal spanning tree - Kruskal's algorithm, Maximum flow models. Project management- CPM and PERT networks.

TEXT BOOKS

1. Taha, Introduction to Operations Research, New Delhi, 8th Edition, Printice Hall International Publisher, 2016.
2. A.M. Natarajan, P. Blalsubramani & A Tamilarasi, Operatiaons Research, New Delhi. 1st Edition, Pearson Piblishers, 2005.

REFERENCE BOOKS

1. Hiller & Liberman, Introduction to Operations Research, Noida RC, 7th Edition,Tata Mc Graw Hill publication
2. R. Panneerselvam, Operations Research, New Delhi, 2nd Edition, Prentice Hall International Publisher, 2006

Mapping of COs with POs & PSOs

	PO1	PO2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3											3	1
CO3	3	3	3										3	
CO4	3	3		3									3	
CO5	3	3											3	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
III B. TECH II-SEMESTER
(Common to ME, CSE, IT, CSE (AI&ML) & CSE (DS))
IV B. Tech I Semester
(Common to CE & EEE)

L	T	P	C
3	0	0	3

20AMB09 INTELLECTUAL PROPERTY RIGHTS
(Open Elective – II)

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. Outline different types of intellectual properties.
2. Distinguish the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
3. Formulate designs, patent and copyright for their innovative research works.
4. Apply intellectual property law principles of Trademarks to real problems.
5. Examine ethical and professional issues which arise in the intellectual property law context.

UNIT - I: UNDERSTANDING AND OVERVIEW OF IPR

Introduction- meaning- nature- forms of intellectual property- types of intellectual property-industry property-International conventions.

UNIT-II: COPYRIGHT ACT, 1957

Meaning –Nature and object of copyright-origin and development of copyright law in India-salient features of copyright act,1957-Definitons- originality material-rights of reproduction.

UNIT-III: TRADEMARKS ACT, 1999

Salient features of Trademarks Act, 1999-Meaning- objectives and functions of trademark-Definition of Trademark- trademark protection- -acquisition of Trademark rights-protectable matter-trademark registration process.

UNIT-IV: PATENT ACT, 1970

Meaning –definition of patent-history and concept of patent law-salient features of the patent act- Definition-kinds of patents and advantages-rights and obligations of patentee- Process of obtaining a patent.

UNIT-V: DESIGNS ACT, 2000

Meaning –definition- Salient features of Designs-Registration of Designs-Rights granted to design holders -Infringement of Design.

TEXT BOOKS

1. Narayanan, P.(Revised 2017, Reprint 2018).Patent Law. Eastern Law House.
2. Acharya, N.K. (2021). Intellectual Property Rights: Scandinavian Languages Edition.
3. Chowdhary, R., S.K. & Other. Law of Trademark, Copyrights, Patents and Designs.
4. Reddy, G.B., Intellectual Property Rights and the Law, Gogia Law Agency.
5. Holyoak, J. &Torremans, P. Intellectual Property Law.

REFERENCES

1. Bouchoux, E.B. Intellectual Property Rights, Cengage Learning.
2. Ganguli, P. Intellectual Property Rights– Unleash my knowledge, Economy. Tata McGraw Hill Publishing Company Ltd.
3. Wadhera, B.L. Intellectual Property Law, Universal Publishers.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO3	-		3	3	3	-	-	-	-	-	-	-	1	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	1
CO5	-	-	-	-	-	-	-	3	-	-	-	-	1	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
3	0	0	3

20ACM12 - GO PROGRAMMING LANGUAGE

(Job Oriented Elective – II)

COURSE OUTCOMES

After completion of the course, the student will able to do

1. Explain the foundations of Go Programming language.
2. Identify the types, variables, control structures & arrays in GO Programming.
3. Apply the concepts of functions, pointers, structs & Interfaces.
4. Apply the concept of the packages for development of real-time applications

UNIT I – FOUNDATIONS OF GO PROGRAMMING 9

The GO PROGRAMMING: Go Programming Basics – its Files and folders – the Basic terminal of the program – How to install in all the operating systems – Windows – OSX – Do a process with the text editors – Its operations – Its Tools and templates – How to write, read the first program.

UNIT II – DATA TYPES AND VARIABLES 9

DATA TYPES: Basic types – process – syntax – Numbers Data Type – To implement integer, its types – syntax, Floating point numbers, its syntax – various operations. String Data Type: String – To implement string, its types – Boolean data type: Boolean Expressions and its value – **Variables:** Importing the variable – it's assigning – how to name the variable – its scope. Constants: Its import and to define a multi variables.

UNIT III – CONTROL STRUCTURES AND ARRAYS 9

CONTROL STRUCTURES: Initialization of structures – **For Loop** – Its Declaration, packages, Syntax, its condition – **if Loop** – Its Declaration, packages, Syntax, its condition **- switch Loop** – Its Declaration, packages, Syntax, its condition **- Arrays –** Its Definition – Its syntax , its slice and mapping – Slices – Its Definition – Its syntax , its slice and mapping – Maps - Its Functions.

UNIT IV – FUNCTIONS, POINTERS **9**

FUNCTIONS – It’s Declaration of functions, Initialization with the second variable function – Returning with the multiple values – its variadic functions – closure and its recursion **Pointers** – Its Declaration, packages, Syntax, its and & or operator condition – New operator.

UNIT V – CORE PACKAGES **9**

PACKAGES – Creating a package – To Initiate the string – its input and output – To access the files and folder – its Error detection and analysis – **Containers**: sorting – using hash function – Cryptography – Servers – Command line arguments – its Primitives.

TEXT BOOKS/ REFERENCES

1. “An Introduction to Programming in Go “Copyright ISBN: 978-1478355823 © 2012 by Caleb Doxsey.
2. The Introduction to Go Programming Language by Alan A. A. Donovan, Brian W. Kernighan Publisher(s): Addison-Wesley Professional ISBN: 9780134190570.
3. Go Programming Language, The (Addison-Wesley Professional Computing Series) 1st Edition ISBN-13: 978-0134190440 ISBN-10: 9780134190440.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2											2
CO2	2	2	2										3	
CO3	3	2	1											
CO4	2	3	2										2	2

3 – High Mapping **2 – Medium Mapping** **3 – Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. TECH II-SEMESTER (Common to CSE, CSE[AI&ML])

L	T	P	C
3	0	0	3

20ACM13 BUSINESS INTELLIGENCE
(Job Oriented Elective – II)

COURSE OUTCOMES

On completion of the course, student will be able to:

1. Explain the basics of Analytics and Business Intelligence.
2. Define Framework elements, Phases and Development stages in Business Intelligence Life Cycle.
3. Analyze the issues and critical challenges in Business Intelligence for creating user friendly BI solutions.
4. Determine different BI strategies for planning and implementing effective BI solutions.

UNIT -I INTRODUCTION TO BUSINESS INTELLIGENCE 9HRS

Introduction-Data, Information Vs Intelligence- Components of Business Intelligence Architecture-Business Query and Reporting- A Business view of the Data-Production Reporting-Online Analytical Processing (OLAP)-Microsoft Office-dashboards-Scorecards-Analytic Applications-Measures of BI Success -Emerging BI Modules.

UNIT -II BUSINESS INTELLIGENCE LIFE CYCLE 9HRS

Introduction, Business Intelligence Lifecycle, Enterprise Performance Life Cycle (EPLC) Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Strategy, Objectives and Deliverables, Transformation Roadmap, Building a transformation roadmap, BI Development Stages and Steps, Parallel Development Tracks, BI Framework.

UNIT-III BUSINESS INTELLIGENCE USER MODEL 9HRS

Introduction, Evolution of Business Intelligence, Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, OLAP Applications, Applying the OLAP to Data Warehousing, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Future of Business Intelligence.

UNIT-IV BUSINESS INTELLIGENCE ISSUES AND CHALLENGES 9HRS

Critical Challenges for Business Intelligence success, Cross-Organizational Partnership, Business Sponsors, Dedicated Business Representation, Availability of Skilled Team Members, Business Intelligence Application Development methodology, Planning the BI Projects, Business Analysis and Data Standardization, Affect of Dirty Data on Business profitability, Importance of Meta-Data, Silver Bullet Syndrome, Customer Pain Points, Creating Cost Effective Enterprise friendly BI solution

UNIT-V BUSINESS INTELLIGENCE STRATEGY AND ROAD MAP 9HRS

Planning to implement a Business Intelligence Solution, Understand Limitations of Business Intelligence, Business Intelligence Usage, Best use of Business Intelligence, The Advantages of BI with Sales- BI used for the rescue, Organization Culture, Managing Total Cost of Ownership for Business Intelligence, Total Cost of Ownership and Business Intelligence, Managing the TCO of the Business Intelligence, Factors that Affect Total Cost of Ownership.

Total=45Hrs

Text books

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision support and Business Intelligence Systems", Pearson-9th Edition, 2011.
2. Cindi Howson, "Successful Business Intelligence", Tata McGraw-Hill Edition,2008.

Reference Books

1. Grossmann W, Rinderle-Ma," Fundamental of Business Intelligence", Springer, 2015.
2. Foster Provost and Tom Fawcett, "Data Science for Business: What you need to know about data mining and data analytic thinking",2013.

CO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	1	-	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	3	2	-	-	-	-	-	-	-	-	-	3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
III B. Tech II Semester (Common to CSE (DS) and CSE[AIML])

L	T	P	C
0	0	3	1.5

20ACD19 - BIG DATA ANALYTICS WITH HADOOP AND SPARK LAB

COURSE OUTCOME

1. Explain the basic programming constructs of Hadoop and HDFS.
2. Solve Big data problems using Map Reduce Technique in HADOOP.
3. Apply Map Reduce programs for Query processing using Hive.
4. Apply analytics on big data streams using Hadoop Streaming API.

Task 1:

a) Understanding the Hortonworks Sandbox for Hadoop.
b) Installing Hortonworks Sandbox – Sun virtual box/VMware Player on Windows

Task 2:

Understanding and working with basic HDFS operations such as:

- Starting HDFS services,
- Listing files in HDFS.
- Adding files and directories.
- Retrieving files.
- Deleting files.
- Shutting down the HDFS services.

Task 3:

Understanding and Working with Ambari for provision, manage and monitor a Hadoop cluster, and also to integrate Hadoop with the existing enterprise infrastructure.

Task 4:

Write a java map-reduce program for counting the number of occurrences of each word in a text file.

Task 5:

Write a java map-reduce program for mining healthcare data and perform various analysis on healthcare dataset.

Task 6:

Working with HBase:

- Creating, Disabling, Enabling, Describing, Exists, Drop a Table, etc., using HBase Shell

Task 7:

Working with HBase to perform following operation:

- Creating, Update, Read, Delete, Scan, Count and Truncate

Task 8: Installation of Apache PySpark and performing basic operations

Task 9: Develop PySpark program with attributes of SparkConf.

Task 10: Working with PySpark SQL and DataFrames.

Task 11: Working with Apache Spark Machine Learning API - MLlib.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	-	2	-	-	-	-	-	-	-	3	3
C02	3	3	2	-	2	-	-	-	-	-	-	-	3	3
C03	3	2	2	1	2	-	-	-	-	-	-	-	3	2
C04	3	2	2	1	2	-	-	-	-	-	-	-	3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
III B. TECH II-SEMESTER CSE[AI&ML]

L	T	P	C
0	0	3	1.5

20ACM14 MACHINE LEARNING ESSENTIALS LAB

COURSE OUTCOMES:
After the completion of the course the student can able to:
1. Define complexity of Machine Learning algorithms and their limitations.
2. Explain modern notions in data analysis-oriented computing.
3. Apply common Machine Learning algorithms in practice and implementing their own.
4. Apply Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)

2. Extract the data from database using python libraries.

3. Implement k-nearest neighbours classification using python

4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids)

VAR1 VAR2 CLASS
1.713 1.586 0
0.180 1.786 1
0.353 1.240 1
0.940 1.566 0
1.486 0.759 1
1.266 1.106 0
1.540 0.419 1
0.459 1.799 1
0.773 0.186 1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk

medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk
Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.

7. Implement Naïve Bayes theorem to classify the English text.

8. Implement an algorithm to demonstrate the significance of genetic algorithm.

9. Implement the finite words classification system using Back-propagation algorithm.

10. Implement model learning with PyTorch.

11. Use CNN and PyTorch for Implementation of Image Analysis. (For Eg. Use Medical Image like Diabetic Retinopathy)
Ref: https://www.kaggle.com/c/diabetic-retinopathy-detection/data

12. Implement Reinforcement Learning with PyTorch.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	-	2	-	-	-	-	-	-	-	3	2
C02	3	3	2	-	2	-	-	-	-	-	-	-	3	2
C03	3	2	2	-	2	-	-	-	-	-	-	-	3	1
C04	3	2	2	-	2	-	-	-	-	-	-	-	3	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
0	0	3	1.5

20ACM15 - DEEP LEARNING LAB

COURSE OUTCOMES

On completion of the course the student will be able to

1. Identify deep neural network for solving simple problems.
2. Use Convolution Neural Network for image processing.
3. Apply Recurrent Neural Network and its variants for text analysis.
4. Apply generative models for data augmentation.
5. Analyze real-world application using deep neural networks.

LIST OF EXPERIMENTS:

1. Solving XOR problem using Multilayer perceptron
2. Implement character and Digit Recognition using ANN.
3. Implement the analysis of X-ray image using autoencoders
4. Implement Speech Recognition using NLP
5. Develop a code to design object detection and classification for traffic analysis using CNN
6. Implement online fraud detection of share market data using any one of the data analytics tools.
7. Implement image augmentation using deep RBM.
8. Implement Sentiment Analysis using LSTM.
9. Working with NLP for Word Embeddings.
10. Implement NLP Applications with PyTroch.
11. Use Long Short-Term Memory for for Text Synthesis
12. Mini Project: Number plate recognition of traffic video analysis.

Hardware/Software Requirements

Software:

• Understanding on Working of Colab and Transfer Learning Networks
• High end GPU Systems (Huge Computation)

TOTAL:60 PERIODS

REFERENCES

1. Wani, M.A., Raj, B., Luo, F., Dou, D. (Eds.), "Deep Learning Applications", Volume 3, Springer Publications 2022.
2. Stone, James. (2019), " Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning", Sebtel Press, United States, 2019

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	1		3							3	3
CO2	3	2	2	2	2							3	2
CO3	3	2	2	1	2							3	1
CO4	3	3	2		2							3	2
CO5	3	2	2		2							2	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ((Common to CSE, CSE (DS), CSE (AI &ML))

L	T	P	C
1	0	2	2

20ACD22 - SHELL PROGRAMMING
(Skill Course)

Course outcome:

1. Explain the basics of UNIX architecture and different shell utilities.
2. Identify different SHELL environment and utilities supporting for filter operations.
3. Apply the regular expression features and different operations on SED and AWK.
4. Analyze the various Shell programming features of Korn shell and C shell.

UNIT – 1: Introduction to UNIX

The UNIX Operating System - The UNIX Architecture - Features of UNIX - Internal and External Commands - Command Structure.

General-Purpose Utilities - cal - date - echo - printf - bc - script - passwd - PATH - who - uname - tty - stty - pwd - cd - mkdir - rmdir - od.

Handling Files - The File System - cat - cp - rm - mv - more - file - ls - wc - pg - cmp–comm-diff

- gzip - tar - zip - df - du - mount - umount - chmod - The vi editor - security by file Permissions.

UNIT- 2: Introduction to Shells

Unix Session - Standard Streams - Redirection - Pipes - Tee Command - Command Execution - Command-Line Editing - Quotes - Command Substitution - Job Control - Aliases - Variables - Predefined Variables - Options - Shell Environment - Customization.

UNIT – 3: Regular Expressions

Atoms - operators GREP - Operation - grep Family - searching for File Content. SED - Scripts - Operation - Addresses - commands - applications - grep and sed. AWK - Execution - Fields and Records - Scripts - Operations - Patterns - Actions - Associative Arrays - String Functions - String Functions - Mathematical Functions - User – Defined Functions - Using System, commands in awk - Applications - awk and grep - sed and awk.

UNIT - 4: Interactive Korn Shell

Korn Shell Features - Two Special Files - Variables - Output - Input - Exit Status of a Command - eval Command - Environmental Variables - Options - Startup Scripts - Command History - Command Execution Process.

UNIT – 5: Korn Shell Programming

Basic Script concepts - Expressions - Decisions: Making Selections - Repetition - special Parameters and Variables - changing Positional Parameters - Argument Validation - Debugging Scripts - Script Examples.

LIST OF EXPEERIMENTS

Week-1

Session-1

a) Log into the system
b)Use vi editor to create a file called myfile.txt which contains some text.
c) correct typing errors during creation.
d)Save the file
e)logout of the

systemSession-2

a) Log into the system
b) open the file created in session 1
c) Add some text
d) Change some text
e) Delete some text
f) Save the Changes
g) Logout of the system

Week-2

a) Log into the system
b) Use the cat command to create a file containing the following data. Call it mytable usetabs to separate the fields.

1425 Ravi 15.65
4320 Ramu 26.27
6830 Sita 36.15
1450 Raju 21.86

c) Use the cat command to display the file, mytable.
d) Use the vi command to correct any errors in the file, mytable.
e) Use the sort command to sort the file mytable according to the first field. Call thesorted file mytable
f) Print the file mytable
g) Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it mytable
h) Print the new file mytable
i) Logout of the system.

Week-3

1)
   a. Login to the system
   b. Use the appropriate command to determine your login shell
   c. Use the /etc/passwd file to verify the result of step b.
   d. Use the who command and redirect the result to a file called myfile1. Use the morecommand to see the contents of myfile1.
   e. Use the date and who commands in sequence (in one line) such that the output of datewill display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

2)
   a. Write a sed command that the first character in each line in a file.
   b. Write a sed command that deletes the character before the last character in each line ina file.
   c. Write a sed command that swaps the first and second words in each line in a file.

Week-4

a) Pipe your /etc/passwd file to awk, and print out the home directory of each user.
b) Develop an interactive grep script that asks for a word and a file name and then tellshow many lines contain that word.
c) Repeat
d) Part using awk

Week-5

a) Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.

b) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.

c) Write a shell script that determines the period for which a specified user is working on the system.

Week-6

a) Write a shell script that accepts a file name starting and ending line numbers asarguments and displays all the lines between the given line numbers.

b) Write a shell script that deletes all lines containing a specified word in one or morefiles supplied as arguments to it.

Week-7

a) Write a shell script that computes the gross salary of a employee according to the following rules:
i) If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.

ii) If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic.

The basic salary is entered interactively through the key board.

b) Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

Week-8

a) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b) Write shell script that takes a login name as command – line argument and reports when that person logs in.

c) Write a shell script which receives two file names as arguments. It should check whetherthe two file contents are same or not. If they are same then second file should be deleted.

Week-9

a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

b) Develop an interactive script that ask for a word and a file name and then tells how many times, that word occurred in the file.

Week-10

Write a shell script to perform the following string operations:

i) To extract a sub-string from a given string.

ii) To find the length of a given string

Text Books:

1. Unix and shell Programming, 1st Edition, Behrouz A. Forouzan – Richard F.Gilbery, 2003, Cengage Learning India.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, 2006, TMH.

References:

2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, 2008, PearsonEducation.
3. Advanced Unix programming, 2nd Edition, N.B Venkateswarlu, 2010, BS Publications.Unix Shell programming, 1st Edition, Yashwanth Kanitkar, 2010, BPB Publisher.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	2	-	2	-	-	-	-	-	-	-	3	3
CO3	3	3	2	1	2	-	-	-	-	-	-	2	3	2
CO4	3	3	2	-	2	-	-	-	-	-	-	2	3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
III B. Tech - II Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS23 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(Mandatory Course)

Course Outcome:

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

1. Identify various aspects of Traditional knowledge and its importance.
2. Explain briefly to understand the needs and importance of protecting traditional knowledge.
3. Analyze the various systems, concepts and strategies of traditional knowledge.
4. Apply the concepts of traditional knowledge in different sectors.

UNIT I INTRODUCTION TO TRADITIONAL KNOWLEDGE 10

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge.

UNIT II PROTECTION OF TRADITIONAL KNOWLEDGE 10

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III LEGAL FRAMEWORK AND TRADITIONAL KNOWLEDGE 10

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

UNIT IV TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY 10

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge.

UNIT V TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS 10

Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Text Book(s)

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

2. Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino.

Web Links:

3. https://www.youtube.com/watch?v=LZP1StpYEPM

4. http://nptel.ac.in/courses/121106003/

Mapping of COs with POs & PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	3	3	3					2	1
CO2	2	-	-	-	-	3	3	2					1	1
CO3	-	-	-	-	-	3	3	-					1	
CO4	3	-	-	-	-	3	3	3					1	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
IV B. TECH I-SEMESTER

(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS))

L	T	P	C
3	0	0	3

20AMB04 - CREATIVITY AND INNOVATION

COURSE OUTCOMES:
After the completion of the course student will be able to

1. Explain innovation and creativity management from the perspective of obtaining a sustainable competitive advantage and integrating innovation into the business strategy.
2. Explain the attributes of successful innovation strategies including an in-depth understanding of the dynamics of innovation
3. Identify the role that innovation plays in the competitive dynamics of industries and how these innovations affect society.
4. Explain the factors and drivers that predict creativity and innovation of individuals, groups, and organizations
5. Design a creative business concept and develop a business plan.

Unit I: Creativity: Concept - Convergent and Divergent Thinking -Creative Intelligence - Enhancing Creativity Intelligence -Determinants of Creativity - Creativity Process - Roots of Human Creativity - Biological, Mental, Spiritual and Social -Forms of Creativity - Essence, Elaborative and Expressive -Existential, Entrepreneurial and Empowerment.

Unit II: Creative Personality: Creative Personality Traits Congenial to Creativity - Motivation and Creativity - Strategies for changing Motivation - Creativogenic Environment - Formative Environment and Creativity - Adult Environment - Environmental Stimulants - Blocks to Creativity-Strategies for unblocking Creativity.

Unit III: Organizational Creativity: Creative Manager - Techniques of Creative Problem Solving -Creative Encounters and Creative Teams - Perpetual Creative Organizations - Creative Management Practices – Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies-Issues and Approaches to the Design of Creative Organizations Policy frameworks - Organizational Design for Sustained Creativity - Mechanism for Stimulating Organizational Creativity - Creative Diagnosing - Creative Societies - Necessity Model of a Creative Society

Unit IV: Management of Innovation: Nature of Innovation- Concept of Innovation-Historic Retrospective-Typology of Innovations-Innovation Process- Macroeconomic View of Innovation Approaches to Innovations-Assumptions and Barriers to Innovations-Innovation Sources, - Technological Innovations and their Management-Training for Innovation - Management of Innovation-Agents of Innovation -Skills for Sponsoring Innovation.

Unit V: Innovation & Entrepreneurship: Concept of Entrepreneurship- Entrepreneurial opportunities, attitude, traits and tendencies-Design of a Successful Innovative Entrepreneurship-Idea generation & Prototype Development- Social Innovation and Entrepreneurship-Intellectual Property Right (IPR)-Commercialization of Innovations-Startup and Venture development-Pre-incubation and Incubation Stages-Govt. Schemes and funding support to ideas, innovations, and startup-Current trends, development and general awareness on Innovation and startup.

Text Books:

1. Kandwalla, P. N. (2004). Lifelong creativity : an unending quest. Tata Mcgraw-Hill..
2. Khandwalla, P. N. (2022). Corporate Creativity: The Winning Edge (1st ed.). Mc Graw Hill India.

Reference Books:

1. Rastogi, P. N. (2009). Management of technology and innovation: Competing through technological excellence. SAGE Publishing India.
2. Plucker, J. A. (2021). Creativity and innovation: Theory, research, and Practice. Routledge.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	2	2
CO2	-	3	3	3	-	-	-	-	-	-	-	-	2	2
CO3	-	-	3	-	-	3	3	-	-	-	-	-	2	1
CO4	3	3	3	3	-	-	-	-	-	-	-	-	1	1
CO5	-	-	3	-	3	-	-	-	-	-	-	-	1	1

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
IV B. TECH I-SEMESTER

(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS))

L	T	P	C
3	0	0	3

20AMB05 - LEADERSHIP ESSENTIALS

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

1. Identify the concepts and theories of leadership and analyse its relevance to the organizations.
2. Analyze various sources of power, politics and conflict management.
3. Adapt theories of leadership to cases and contexts in organisation.
4. Interpret change, sustainable development and implications of cultural factors in organizations.
5. Develop leadership potential and practices in organizations.

Unit I- Overview and Introduction of Leadership: concepts and functions of leadership; Leadership, Role and Functions of a Leader, Leadership Motives Characteristics of an Effective Leader, Leadership as a Process - the Complexities of Leadership - Effective Leadership Behaviours and Attitudes –Emerging Approaches of leadership.

Unit II- Leadership and Power: Sources of Power, The link between Politics, Power and Conflict, Power and Conflict; Coercion, Trait Approach, Ohio State Leadership Study, The University of Michigan Study, Blake and Mouton's Managerial Grid.

Unit III- Leadership theories and styles: Contingency Theories of Leadership -, The Path-Goal Theory, Transactional Leadership Style Charismatic Leadership. Servant Leadership, Leadership Ethics.

Unit IV- Fostering Organizational Culture and Climate: Vision Building; Developing Strategic Thinking; strategies in developing a culture conducive to change; handling change; Cultural Factors Influencing Leadership Practice.

Unit V- Developing Future Leaders: Strategic Leadership Competencies; 360º Leadership Assessment; The Myers–Briggs Type Indicator (MBTI); developing global leaders in organization.

Textbooks:

1. Peter Guy Northouse. (2021). Introduction to leadership: concepts and practice (5th ed.). Sage.
2. Humphrey, R. H. (2014). Effective leadership: theory, cases, and applications. Sage.

References Books:

1. Bratton, J., Grint, K., & Nelson, D. L. (2005). Organizational leadership. Thomson/South-Western.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	-	-	-	-	-	-	-	3	-	-	-	2	1
CO3	-	-	-	-	-	-	-	-	3	-	-	-	2	2
CO4	-	-	-	-	-	3	3	-	3	3	-	-	1	1
CO5	-	-	-	-	-	-	-	-	3	3	-	-	1	1

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
IV B. TECH I-SEMESTER

(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS))

L	T	P	C
3	0	0	3

20AMB06 - LAW FOR ENGINEERS

Course Outcomes:
After the completion of course the student will be able to:
1. Explain the essential principles of the law relevant to engineering practice
2. Apply the relevant provisions of contract law
3. Use effective contract laws for decision making and problem-solving techniques in different scenarios
4. Recognize and explore key legal requirements for engineering including health & safety, privacy, and professional indemnity.
5. Discuss about the industrial dispute settlement mechanism

UNIT- I: THE NATURE AND SOURCES OF LAW: Definition and nature of law, definition law and morality, classification of law, Overview of Business laws in India – Sources of business law.

UNIT- II: LAW OF CONTRACT: Contract- Essential features of a valid contract – Performance of a contract – Breach of contract and its remedies.

UNIT- III: SPECIAL CONTRACTS: Quasi Contracts – Contingent Contracts – Indemnity and Guarantee – Contract of Agency – Bailment and Pledge.

UNIT- IV: LAW OF TORT: Definition of Tort, Fundamental Purpose Development of Law of Torts-Specific Torts, Negligence, Nervous Shock, Nuisance, Trespass, Defamation False Imprisonment and Malicious Prosecution Purpose.

UNIT- V INDUSTRIAL DISPUTE & SETTLEMENT MECHANISM: Employee Grievances -Collective Bargaining- Industrial Disputes and Resolution Mechanism; **Overview on IPR.**

Text Books:

1. Kapoor, N. D. (1983). Elements of mercantile law: including company law and industrial law. Sultan Chand & Sons.
2. Kunwar Arora, Vibha Arora. (2017). Law for Engineers. Central Law Publications.

Reference Books:

1. Gulshan, S. S. (2009). Business law. Excel Books.
2. Mulheron, R. (2020). Principles of Tort Law. Cambridge University Press.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	3	-	-	-	-	-	-	-	-	-	2	1
CO2	-	3	3	-	-	-	-	-	-	-	-	-	1	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	1	1
CO4	-	3	3	-	-	-	-	-	-	-	-	-	1	1
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
IV B. TECH I-SEMESTER

(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS))

L	T	P	C
3	0	0	3

20AMB07 - ENTREPRENEURSHIP ESSENTIALS

COURSE OUTCOMES

After completion of the course, the students will be able to

1. Explain the Fundamentals and specifics of Entrepreneurship.
2. Apply theoretical concepts in developing an idea and startup a new technology-based company.
3. Prepare marketing and financial plans that are viable in nature.
4 Apply marketing research methods and tools to forecast and to analyze the trend.
5. Develop innovative business solutions with a holistic perspective from concept to reality.

UNIT-I: BASIC ENTREPRENEURSHIP: Entrepreneurial traits, true motivation & leadership, understanding of Entrepreneurial process, understanding of personal aspirations, Entrepreneurial personality development, Entrepreneurial communication, Entrepreneurship in Indian Scenario, Future prospects in India and emerging economies.

UNIT-II: MARKETING AND MARKET RESEARCH: Market dynamics, Market segmentations and creation of derivatives, Marketing Research methodologies, trend, assessment, analysis and forecasting, structural aspects of market. Identification of overall market, addressable market and serviceable market for product and services.

UNIT-III: ENGINEERING DESIGN PROCESS: Introduction to Engineering Design Process; Design Approaches - Forward and Reverse Engineering; Reverse Engineering Process – Definition and goal of Reverse engineering (RE); Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, inventive design strategies and Simulation in Engineering Design - Computer Aided Engineering and Simulation; Engineering Manufacturing and Materials; Sustainability and Design: Recyclability; Reliability and Lean Design Engineering; Interface with Industrial design; Economic considerations in design; Eco Design and Green Engineering Product Development

UNIT – IV: FINANCIAL AND LEGAL ASPECTS OF BUSINESS: Process for effective financial planning, types of budgets preparation, overview of specific ratios to measure financial performance, liquidity, asset management, profitability, leverage and comparative analysis, business laws enshrined in the Indian constitution, the policies of the state, Income tax structure, the labor laws.

UNIT –V: MANAGEMENT OF GROWTH VENTURE: Importance of Innovation as a differentiator in growth venture, Underlying opportunities, Strategic management for Launching process of growth ventures, understanding organizational & institutional aspects of growth ventures, Exit strategies of Growth ventures, Future prospects of venture financing of growth venture firms.

TEXT BOOKS:

1. Allen, K. R. (2018). Launching New Ventures: An Entrepreneurial Approach. United States: Cengage Learning.
2. Khanka, S. S. (2006). Entrepreneurial Development. India: S. Chand Limited.
3. Nelson, A. J., Byers, T. H., Dorf, R. C. (2018). Technology Ventures: From Idea to Enterprise. United Kingdom: McGraw-Hill Education.

REFERENCES:

1. Harrington, H. J. (2018). Creativity, Innovation, and Entrepreneurship: The Only Way to Renew Your Organization. United States: Taylor & Francis.
2. Smith, A., Pigneur, Y., Papadakos, T., Osterwalder, A., Bernarda, G. (2015). Valu e Proposition Design: How to Create Products and Services Customers Want. Germany: Wiley.
3. Allen, K. R. (2010). Entrepreneurship for Scientists and Engineers. United Kingdom: Pearson Prentice Hall.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	-	3	-	1	-	-	-	3	-	2	2
CO2	-	2	3	-	3	-	-	-	-	-	3	-	2	2
CO3	-	-	-	-	-	-	-	-	-	-	3	-	1	1
CO4	-	2	3	-	-	-	-	-	-	-	-	-	1	1
CO5	2	-	3	-	-	-	-	-	1	-	3	-	1	1

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
IV B. TECH I-SEMESTER
(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS))

L	T	P	C
3	0	0	3

20AMB08 - ESSENTIALS OF MANAGEMENT SCIENCE

Course Outcomes

After completion of the course student will be able to

1. Apply various areas of functional management for the prospects of business organization.
2. Apply management principles for decision making.
3. Apply various functions of HR manager.
4. Use tools and techniques to become an effective manager.
5. Apply production tools and techniques in every area of business

UNIT-I INTRODUCTION TO MANAGEMENT: Nature, importance and Functions of Management, Approaches to Management - Taylor's Scientific Management - Henry Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles.

UNIT-II INTRODUCTION TO ORANISATION: Types of Mechanistic and organic structures. Delegation, Decentralization - Formal and Informal Organization

UNIT III OPERATIONS MANAGEMENT: Principles and Types of Plant Layout - Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement

UNIT IV MATERIALS MANAGEMENT: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records, Marketing: Functions of Marketing, Marketing Mix, Product Life Cycle and Channels of Distribution.

UNIT V HUMAN RESOURCES MANAGEMENT (HRM): Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration, Job Evaluation and Merit Rating, Performance Appraisal

Text Books:

1. Aryasri, Management Science, TMH, 4th Edition, 2009.
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 6th Edition, 2004.
3. Panner Selvem, Production and Operations Management, Prentice Hall of India, 3rd Edition, 2012

Reference Books:

1. Kotler Philip & Keller Kevin Lane, Marketing Management, PHI, 12th Edition, 2005.
2. Koontz & Weihrich, Essentials of Management, TMH, 6th Edition, 2005.
3. SubbaRao. P, Personnel and Human Resource Management, Himalaya Publishing House, 2000

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	3	-	2	2
CO2	-	-	-	-	-	-	-	-	3	-	3	-	2	2
CO3	-	-	-	-	-	-	-	-	3	-	-	-	1	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	2	1
CO5	-	-	-	-	-	-	-	-	-	-	3	-	2	2

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. TECH I SEMESTER Common to CSE, IT CSE(DS), CSE (AI & ML)

L	T	P	C
3	0	0	3

20AIT20 - SOFTWARE TESTING
(Professional Elective -III)

COURSE OUTCOMES
CO1: Design test cases suitable for a software development for different domains.
CO2: Identify suitable tests to be carried out.
CO3: Prepare test planning based on the document.
CO4: Document test plans and test cases designed.
CO5: Use automatic testing tools and develop and validate a test plan.

UNIT-I INTRODUCTION

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT - II TEST CASE DESIGN STRATEGIES

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

UNIT - III LEVELS OF TESTING

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing –Compatibility testing – Testing the documentation – Website testing.

UNIT - IV TEST MANAGEMENT

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group. The Technical Training Program.

UNIT - V TEST AUTOMATION

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

TEXT BOOKS

1. Srinivasan Desikan and Gopalaswamy Ramesh, ―Software Testing – Principles and Practices‖, Pearson Education, 2006.

2. Ron Patton, ―Software Testing‖, Second Edition, Sams Publishing, Pearson Education, 2007. AU Library.com

REFERENCES

1. Ilene Burnstein, ―Practical Software Testing‖, Springer International Edition, 2003.

2. Edward Kit,‖ Software Testing in the Real World – Improving the Process‖, Pearson Education, 1995.

3. Boris Beizer,‖ Software Testing Techniques‖ – 2nd Edition, Van Nostrand Reinhold, New York, 1990.

4. Aditya P. Mathur, ―Foundations of Software Testing _ Fundamental Algorithms and Techniques‖, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

CO-PO MAPPING:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	-	1	2
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	1
CO3	2	3	3	-	3	-	-	-	-	-	-	-	3	2
CO4	2	3	3	-	2	-	-	-	-	-	-	-	2	1
CO5	3	3	-	2	3	-	-	-	-	-	-	-	1	2

Correlation Levels: 3 - High 2 - Medium 1 - Low

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester (Common To CSE, CSE (DS), CSE (AI&ML) & IT)

IV B. Tech I Semester ECE (Open Elective-III)

L	T	P	C
3	0	0	3

20ACS39 CLOUD COMPUTING

(Professional Elective - III)

Course Outcome

After completion of this course, students will be able to:

1. Implement fundamental cloud computing concepts.
2. Implement classical algorithms, including Ricart-Agrawala's algorithm and Maekawa's algorithm
3. Ensure transactions commit correctly in spite of replication.
4. Perform operations on Hadoop distributed file systems and develop virtualization applications

UNIT I 6Hrs

Introduction to Clouds, MapReduce: Introduction to Cloud Computing Concepts, Orientation Towards Cloud Computing Concepts, Some Basic Computer Science Fundamentals, Introduction, Why Clouds? What is a Cloud?, History, What's New in Today's Clouds, Introduction to Clouds: New Aspects of Clouds, Introduction to Clouds: Economics of Clouds, A cloud IS a distributed system, What is a distributed system?, MapReduce Paradigm, MapReduce Examples, MapReduce Scheduling, MapReduce Fault-Tolerance.

UNIT II 10Hrs

Gossip, Membership, and Grids: Introduction, Multicast Problem, The Gossip Protocol, Gossip Analysis, Gossip Implementations, What is Group Membership List?, Failure Detectors, Gossip-Style Membership, Which is the best failure detector?, Another Probabilistic Failure Detector, Dissemination and suspicion, Grid Applications, Grid Infrastucture

P2P Systems: Introduction, Napster, Gnutella, FastTrack and BitTorrent, Chord, Failures in Chord, Pastry, Kelips, Blue Waters Supercomputer.

Key-Value Stores, Time, and Ordering: Why Key-Value/NOSQL? Cassandra, The Mystery of X-The Cap Theorem, The Consistency Spectrum, HBase, Introduction and Basics, Cristian's Algorithm, NTP, Lamport Timestamps, Vector Clocks.

UNIT III 8Hrs

Classical Distributed Algorithms: What is Global Snapshot?, Global Snapshot Algorithm, Consistent Cuts, Safety and Liveness, Multicast Ordering, Implementing Multicast Ordering, Implementing Multicast Ordering, Reliable Multicast, Virtual Synchrony, The Consensus Problem, Consensus In Synchronous Systems, Paxos, Simply, The FLP Proof, Orientation Towards Cloud Computing Concepts: Some Basic Computer Science Fundamentals, Introduction, The Election Problem, Ring Leader Election, Election in Chubby and ZooKeeper, Bully Algorithm, Introduction and Basics, Distributed Mutual Exclusion, Ricart-Agrawala's Algorithm, Maekawa's Algorithm and Wrap-Up.

UNIT IV

Concurrency and Replication Control: RPCs, Transactions, Serial Equivalence, Pessimistic Concurrence, Optimistic Concurrency Control, Replication, Two-Phase Commit.

Emerging Paradigms: Stream Processing in Storm, Distributed Graph Processing, Structure of Networks, Single-processor Scheduling, Hadoop Scheduling, Dominant-Resource Fair Scheduling, Storm Demo, Apache Spark by Faria Kalim.

UNIT V

Classical Systems: Introduction, File System Abstraction, NFS and AFS, Distributed Shared Memory, Sensor and Their Networks.

Real-Life Behaviors: Introduction, Basic Security Concepts, Basic Cryptography Concepts, Implementing Mechanism using Cryptography, What Causes Disasters?, AWS Outage, Facebook Outage, The Planet Outage, Wrap-Up.

Text book

1. https://www.coursera.org/learn/cloud-computing
2. https://www.coursera.org/learn/cloud-computing-2
3. Kobusińska, A., Leung, C., Hsu, C. H., Raghavendra, S., & Chang, V. (2018). Emerging trends, issues and challenges in Internet of Things, Big Data and cloud computing. Future Generation computer systems, 87, 416-419.
4. Dyer, J. (2018). Secure computation in the cloud using MapReduce. The University of Manchester (United Kingdom).

Reference Book

1. "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	1	3	1	2	-	-	1	2	3
CO2	3	3	3	3	3	3	1	3	-	-	-	1	3	3
CO3	3	3	3	3	3	-	-	1	-	2	-	-	3	
CO4	3	3	3	3	3	-	-	-	-	2	-	3	3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM16 – VIDEO AND IMAGE PROCESSING
(Professional Elective -III)

COURSE OUTCOMES:

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

1. Explain the elements of visual perception and basic operations of Imaging systems.
2. Use Image Enhancement and Restoration techniques for improving the image quality.
3. Apply various segmentation and morphological algorithms.
4. Analyze Video processing and segmentation techniques for real-time applications

UNIT I FUNDAMENTALS OF IMAGING SYSTEM 9

Introduction – Elements of visual perception, Steps in Image Processing Systems – Digital Imaging System – Image Acquisition – Sampling and Quantization – Pixel Relationships – File Formats – colour images and models – Image Operations

UNIT II IMAGE ENHANCEMENT AND RESTORATION 9

Image Transforms – Enhancement in the Spatial Domain –enhancement in the Frequency Domain– Image restoration.

UNIT III IMAGE SEGMENTATION AND MORPHOLOGY 9

Detection of Discontinuities – Edge operators- Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Motion Segmentation- Binary and Gray level morphology operations – Erosion, Dilation, Opening and Closing Operations Distance Transforms- Basic morphological Algorithms. Features – Textures – Boundary representations and Descriptions- Component Labeling – Regional Descriptors and Feature Selection Techniques.

UNIT IV BASICS OF VIDEO ELEMENTS 9

Introduction – Video Sampling - Interpolation- Motion Detection - Estimation – Video Enhancement - Video Restoration

UNIT V VIDEO SEGMENTATION, TRACKING &APPLICATIONS 9

Video Segmentation- Motion Segmentation- Motion Tracking in Video-Video Quality Assessment- Case Studies –Image processing in Biometrics, Image Security, Steganography and Watermarking, Stereo vision, Object Segmentation and Tracking in the Presence of Complex Background in video, Forensic video analysis.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Pearson Education, 2008, New Delhi.
2. S.Sridhar, "Digital Image Processing", Oxford University Press, 2011, New Delhi.

REFERENCE BOOKS

1. A l Bovik (Alan C Bovik), “The Essential Guide to Video Processing”, Academic Press, Second Edition, 2009.
2. Murat Tekalp “Digital Video Processing”, Prentice Hall, 1995
3. Oges Marques, “Practical Image and Video Processing Using MATLAB”, Wiley-IEEE Press, 2011.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	2
CO2	3	2	2									2	1
CO3	3	3	3									2	2
CO4	3	2	3									2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM17 - BLOCK CHAIN TECHNOLOGY
(Professional Elective -III)

COURSE OUTCOME

1. Summarize the concepts of Blockchain categories, mining mechanism and its features.
2. Gain familiarity with Blockchain architecture and Consensus algorithms.
3. Use Web3j library for smart contracts and integrating with clients.
4. Apply the Block chain services using ICO on Ethereum network
5. Analyze the adoption of block chain for different domain specific applications.

UNIT-I INTRODUCTION TO BLOCKCHAIN 9

Introduction to Block chain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

UNIT-II BLOCKCHAIN ARCHITECTURE 9

Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET).

UNIT-III BLOCKCHAIN-BASED FUTURES SYSTEM 9

Project presentation- Futures smart contract: Blockchain oracles- Web3j: Setting up the Web3J- Installing web3j- Wallet creation, Java client: The wrapper generator- Initializing web3j- Setting up Ethereum accounts- Deploying the contract.

UNIT-IV BLOCKCHAINS IN BUSINESS AND CREATING ICO 9

Public versus private and permissioned versus permission less blockchains- Privacy and anonymity in Ethereum- Why are privacy and anonymity important? - The Ethereum Enterprise Alliance- Blockchain as-a-Service- Initial Coin Offering (ICO): Project setup for ICO implementation- Token contracts- Token sale contracts-Contract security and testing the code.

UNIT-V DOMAIN SPECIFIC APPLICATIONS 9

Applying AI & Blockchain: Healthcare, Supply chain, Financial Services, Information Security, Document management, AI & Blockchain Driven Databases - Centralized versus distributed data, Big data for AI analysis, Data Management in a DAO, Emerging patterns for Database Solution

TEXT BOOKS

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018.
2. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger", Packt Publishing Limited, 2018

REFERENCE BOOKS

1. Andreas M. Antonopoulos , "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media Inc, 2015.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	-	-	-	-	-	-	-	-	-	3	3
C02	3	3	2	-	-	-	-	-	-	-	-	-	3	2
C03	3	2	2	-	2	-	-	-	-	-	-	-	3	2
C04	3	2	2	1	-	-	-	-	-	-	-	-	3	2
CO5	3	3	2										3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM18 - STATISTICAL NATURAL LANGUAGE PROCESSING
(Professional Elective -III)

COURSE OUTCOMES:

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

1. Explain different linguistic components of speech processing
2. Describe the concept of morphological analyzer using finite state automata concepts.
3. Apply Earley algorithm for providing suitable grammar and words.
4. Analyze the usage of tagger to semantically tag the words using WordNet.

UNIT I 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 - Tagsets - Rule-Based - HMM - Transformation-Based Tagging - Evaluation and Error Analysis. Hidden Markov and Maximum Entropy Models

UNIT II 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 III SYNTAX ANALYSIS 9

Formal Grammars of English – Constituency - Context-Free Grammars –Grammar Rules – Treebanks - 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 IV 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 V 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: 45 PERIODS

TEXT BOOKS/REFERENCES:

1. Jurafsky and Martin, "Speech and Language Processing", Pearson Prentice Hall, Second Edition, 2008.
2. Christopher D. Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
3. Stevan Bird, "Natural Language Processing with Python", Shroff, 2009.
4. James Allen, "Natural Language Understanding", Addison Wesley, Second Edition, 2007.
5. NitinIndurkhya, Fred J. Damerau, "Handbook of Natural Language Processing", (Chapman& Hall/CRC Machine Learning & Pattern Recognition), Second Edition, 2010.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2									2	2
CO2	3	3	1									3	2
CO3	3	3	2									3	2
CO4	3	3	3									3	2

3-High Mapping 2-Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. TECH I-SEMESTER (Common to CSE (DS), CSE (AI&ML) & IT)

L	T	P	C
3	0	0	3

20AIT24 - SOFTWARE QUALITY ASSURANCE AND TESTING
(Professional Elective -IV)

COURSE OUTCOMES:
Upon completion of this course, the students should be able to

CO1: Perform functional and nonfunctional tests in the life cycle of the software product.
CO2: Understand system testing and test execution process.
CO3: Identify defect prevention techniques and software quality assurance metrics.
CO4: Apply techniques of quality assurance for typical applications.

UNIT I SOFTWARE TESTING - CONCEPTS, ISSUES, AND TECHNIQUES

Quality Revolution, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black, test Planning and design, Test Tools and Automation, Power of Test. Test Team Organization andmanagement-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building.

UNIT II SYSTEM TESTING

System Testing - System Integration Techniques-Incremental, Top-Down Bottom-Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built-in Testing. functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models.

UNIT III SYSTEM TEST CATEGORIES

System test categories Taxonomy of System Tests, Interface Tests Functionality Tests. GUI Tests, Security Tests Feature Tests, Robustness Tests, Boundary Value Tests Power Cycling Tests Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests.

Test Generation from FSM models- State-Oriented Model. Finite-State Machine Transition Tour Method, Testing with State Verification. Test Architectures-Local, distributed, Coordinated, Remote. system test design- Test Design Factors Requirement Identification, modeling a Test Design Process Test Design Preparedness, Metrics, Test Case Design Effectiveness. system test execution- Modeling Defects, Metrics for Monitoring Test Execution. Defect Reports, Defect Causal Analysis, Beta testing, measuring Test Effectiveness.

UNIT IV SOFTWARE QUALITY

Software quality - People's Quality Expectations, Frameworks and ISO-9126, McCall's Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models- Test Process Improvement, Testing Maturity Model.

UNIT V SOFTWARE QUALITY ASSURANCE

Quality Assurance - Root Cause Analysis, modeling, technologies, standards and methodologies for defect prevention. Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees. Comparing Quality Assurance Techniques and Activities.QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement. Case Study: FSM-Based Testing of Web-Based Applications.

Co-Po Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	3	2	-	-	-	-	-	-	-	3	2
C02	3	1	2	2	1	-	-	-	-	-	-	-	3	2
C03	2	2	2	3	1	-	-	-	-	-	-	-	2	1
C04	2	2	1	3	1	-	-	-	-	-	-	-	2	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM19 - AI FOR ENGINEERING APPLICATIONS
(Professional Elective -IV)

COURSE OUTCOME
On completion of the course, the students will be able to
1. Explain the fundamentals of artificial intelligence (AI) and Problem-solving search Techniques.
2. Use case-based reasoning for solving new problems based on the solutions of similar past problems.
3. Identify the role of NLP for Information Retrieval, Extraction and Speech recognition.
4. Apply AI concepts for engineering and medical applications.
5. Analyze the AI function for implementing robots and drones.

UNIT 1 INTRODUCTION AND PROBLEM SOLVING 9 Hrs.
Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies, Heuristic Functions – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information, Heuristic

UNIT 2 CASE-BASED REASONING 9 Hrs.
Introduction ,Applications of Case-Based Reasoning , Planning , Design , Diagnosis, Case-Based Reasoning Process, Case Retrieval, Selection by search conditions, Classification by relevance , Classification by performance , Illustration of the case retrieval process , Solution Transformation , Problem detection , Focusing on appropriate parts , Solution transformation ,Evaluation and testing ,Case Storing ,A Framework for CBR in Engineering Design (CASETOOL) , Case Retrieval , Solution Transformation , Case Storing , Architecture of CASETOOL , Application Example , Architecture of VASTU , CBR Process in VASTU.

UNIT 3 NATURAL LANGUAGE PROCESSING: 9 Hrs.
Language Models, Text Classification, Information Retrieval, Information Extraction, phrase Structure Grammars, Syntactic Analysis, Augmented Grammars and Semantic Interpretation, Machine Translation, speech Recognition

UNIT 4 CONSIDERING THE USES OF AI IN SOCIETY 9 Hrs.
AI uses in computer Applications: Introducing Common Application Types, Seeing How AI Makes Application Friendlier, Performing Corrections Automatically, Making Suggestions, considering AI based errors. Using AI to Address Medical Needs: Implementing Portable Patient Monitoring, Making Humans More Capable, Addressing Special Needs, Devising New Surgical Techniques, Performing Tasks Using Automation, combining Robots and Medical Professionals.

UNIT 5 WORKING WITH AI IN HARDWARE APPLICATIONS 9 Hrs.
Developing Robots: Defining Robot Roles, Overcoming the sci-fi view of robots, knowing why it’s hard to be humanoid, working with robots, Assembling Basic Robot, Considering the

components, Sensing the world, Controlling a robot Flying with Drones: Acknowledging the state of the art, Flying unmanned to missions, Meeting the quad copter, Defining Uses of Drones, Seeing drones in non-military roles, powering up drones using AI, Understanding regulatory issues, Utilizing the AI –Driven Car: Understanding the Future of Mobility, Getting into a self-driving car, Overcoming Uncertainty of Perceptions

TOTAL:45 PERIODS

TEXT / REFERENCE BOOKS

1. Stuart Russell and Peter Norvig," Artificial Intelligence a Modern Approach", Third Edition, Pearson Education Limited ,2016
2. Artificial Intelligence for Dummies, John Wiley & Sons, Inc.,
3. C.S. Krishnamoorthy; S. Rajeev," Artificial Intelligence and Expert Systems for Engineers", CRC Press, LLC ISBN: 0849391253,1996.
4. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Pearson Education India; 1st edition, January 2004.
5. Introduction to Artificial Neural Systems, Jaico Publishing House; First edition, January 1994.
6. ARTIFICIAL INTELLIGENCE,3rd edition, McGraw Hill Education, July 2017.
7. Qiangfu ZHAO and Tatsuo Higuchi, "Artificial Intelligence: from fundamentals to intelligent searches", Kyoritsu, 2017, ISBN:978-4-320-12419-6.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2									3	2
CO2	3	2	1									2	3
CO3	3	3	2									3	2
CO4	3	3	1									3	2
CO5	3	2	2									3	2

3-High Mapping   2-Medium Mapping   1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM20 APPLICATIONS OF MACHINE LEARNING IN INDUSTRIES
(Professional Elective -IV)

COURSE OUTCOMES

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

1. Explain the advanced concepts of machine learning and deep learning.
2. Identify appropriate machine learning algorithms banking domain
3. Apply Machine Learning for developing predictive model in the Healthcare domain.
4. Analyze the adoption of machine learning algorithms in Education, Media and Communication Sectors.

UNIT 1 ADVANCED MACHINE LEARNING 9 Hrs.

Deep learning for customer services, Chatbot: Deep learning approach, AI powered marketing systems, Deep learning in cyber security, Types of cyber-attacks in banks, Deep learning methods used in cyber security, Deep learning v/s restricted Boltzmann machines, Convolution Neural Networks (CNNs), Recurrent neural networks, Machine learning techniques: Loan underwriting & sentiment/news analysis, Sentiment or news analysis, Current challenges and opportunities: Banking and security domain.

UNIT 2 MACHINE LEARNING IN BANKING AND SECURITIES 9 Hrs.

Role of machine learning in banking sector, Use of AI in banking and finance, Fraud detection, Customer data management, Personalized marketing, Challenges of banking sector and securities, Widely used machine learning algorithms in banking and security, Fraud prevention and detection systems, Rule based and machine learning based approach in fraud detection, Anomaly detection: Ways to expose suspicious transactions in banks, Advanced fraud detection systems, Risk management systems Case study: Application of machine learning for financial risk management, Credit risk analysis using machine learning classifier, Investment prediction systems

UNIT 3 HEALTHCARE AND LIFE SCIENCES 9 Hrs.

Applications of machine learning in health and life sciences, Role of machine learning in drug discovery, Medical image analysis, Deep learning for medical image analysis, Neural network and deep learning architecture, Comparisons between architecture of different types of deep learning models, Machine learning in genetics and genomics, Genomics and AI background, Interpreting deep learning models, Predictive medicine: Prognosis and diagnostics accuracy, Predictive medicine: Examples, ML applications in breast cancer diagnosis and prognosis.

UNIT 4 MACHINE LEARNING IN EDUCATION 9 Hrs.

Advantages of machine learning in education, learning analytics, Academic analytics, Action research, Educational data mining, Recommender system, Personalized adaptive learning, Learning analytics process Case study: Sentimental analysis for student's feedback using ML, Recommender systems in education, Domain model, Learner model, Students classification algorithm, Recommendation model, Case study: Application of ML in predicting students' performance, Proposed methodology, Data description, Sample data sets, Visualization, Selection of machine learning technique.

UNIT 5 MEDIA AND COMMUNICATION 9 Hrs.

Machine learning in communication, media and entertainment, Usage of machine learning in media and entertainment industry, Machine learning techniques for customer sentiment analysis, World embedding's, Sentiment analysis with long short term memory networks, Real-time analytics in communication, media and entertainment industries, Real time analytics and social media, Deep learning for social media analytics, Recommendations engines, Collaborative filtering, Memory based collaborative filtering, Model based collaborative filtering, Content based filtering, Hybrid recommendation systems, Summary of recommendation systems, Deep learning techniques on recommender systems

TOTAL:45 PERIODS

TEXT BOOKS

1. Application of machine learning in industries, IBM ICE Publications
2. Machine Learning Algorithms for Industrial Applications, Studies in Computational Intelligence, Springer Book series, 2021.
3. Pedro Larrañaga, David Atienza, Javier Diaz-Rozo, Alberto Ogbechie, Carlos Esteban Puerto-Santana, Concha Bielza, Industrial Applications of Machine Learning, ISBN 9780367656874, CRC press, 1st edition, 2020

REFERENCE BOOKS

1. Ian Goodfellow, YoshuaBengio, and Aaron Courville, Deep Learning, ISBN: 978-0262035613
2. Trevor Hastie, Robert Tibshirani, and Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer series in statistics, 2nd edition, 2019, ISBN: 978-0387848570
3. Drew Conway and John Myles White, Machine Learning for Hackers: Case Studies and Algorithms to Get you Started, First Edition, O'Reilly Media, 2020
4. John D. Kelleher, Brian Mac Namee, and Aoife D'Arcy, 13. Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies, MIT press, 1st edition, 2020.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	
CO2	3	3	2									2	3
CO3	3	2	2									3	
CO4	3	1	1										3

3-High Mapping 2-Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	**0**	**0**	**3**

20ACM21 - AI AND GAMING APPLICATION
(Professional Elective -IV)

COURSE OUTCOMES
On completion of the course, student will be able to
1. Explain the Models and complexities of Game AI.
2. Identify the for Computational geometry and Analytical Geometry.
3. Select the appropriate AI algorithms for motor control and motion planning.
4. Apply efficient and robust AI algorithms for decision making and tactical analyses.
5. Analyze learning algorithms and game playing approaches to real world applications

UNIT 1 INTRODUCTION TO GAME AI 9 Hrs.
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 Hrs.
Simple State Machines – Computational Geometry – Kinetic and Dynamic Movement – Steering and combining steering – Analytical Geometry 2

UNIT 3 COORDINATED MOVEMENT AND MOTOR CONTROL 9 Hrs.
Interaction with Physics engine – Jumping – Coordinated movement – Motor Control – Pathfinding: pathfinding graphs – Dijkstra – A* – hierarchical pathfinding – motion planning

UNIT 4 DECISION MAKING, TACTICS AND LEARNING 9 Hrs.
Decision Making: Decision tree – State Machines – Fuzzy Logic Markov Systems – Goal-oriented behavior – Rule-based systems – black board architectures – Tactics and Strategy: waypoint tactics, tactical analyses, tactical pathfinding, coordinated action

UNIT 5 LEARNING AND GAME PLAYING 9 Hrs.
Learning: Decision tree learning, Naive Bayes, Reinforcement learning, Artificial Neural Networks – Game Playing: game theory, minimax, transposition tables, opening books and set plays, turn-based strategy games

TEXT / REFERENCE BOOKS

1. Artificial Intelligence for Games, 2nd edition, by Ian Millington and Morgan Kaufmann, 2009.
2. Sadler, Matthew, and Natasha Regan. "Game changer." AlphaZero's Groundbreaking Chess Strategies and the Promise of AI. Alkmaar. The Netherlands. New in Chess (2019).
3. 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.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	3									2	2
CO2	3	2	1									2	1
CO3	3	2	2									3	3
CO4	3	2	1									3	1
CO5	3	3	1									2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM22 - AI IN SPEECH PROCESSING
(Professional Elective -IV)

COURSE OUTCOMES
On completion of the course the student will be able to:
1. Describe the basics of speech processing concepts.
2. Evaluate different Speech modeling mechanism
3. Apply AI based Speech modeling and recognition approaches.
4. Analyze various speech synthesis methods

UNIT 1 INTRODUCTION 9 Hrs.
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 Hrs.
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 Hrs.
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 Hrs.
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 Hrs.
Speech Synthesis: Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub- word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Max.45 Hours

TEXT /REFERENCE 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 (3rd edition),Dan Jurafsky and James H. Martin, October 16, 2019
3. Lawrence RabinerandBiing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education,2008.
4. Steven W. Smith, “The Scientist and Engineer’s Guideto DigitalSignal Processing”, California TechnicalPublishing. 2011
5. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education.2002
6. Claudio Becchettiand LucioPrinaRicotti, “Speech Recognition”, John Wiley and Sons, 1999.
7. Ben gold and Nelson Morgan, “Speech and audio signal processing”, processing and perceptionofspeechandmusic,Wiley-IndiaEdition,2006Edition.
8. FrederickJelinek, “Statistical Methods of Speech Recognition”, MIT Press,1998
9. Himanshu Mohan, Megha Yadav, " Speech Recognition System and its Application”, LAP LAMBERT Academic Publishing,2019.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	1									3	
CO2	3	2	1									3	2
CO3	3	3	2									2	3
CO4	3	3	2									2	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester (Common to CSE, IT),
IV B Tech I Sem Professional Elective-V CSE(DS), CSE (AI& ML)
IV B Tech I Sem ME, ECE (Open Elective-IV)

L	T	P	C
3	0	0	3

20ACS28- INTERNET OF THINGS(IoT)
(Professional Elective -V)

COURSE OUTCOMES:

At the end of the course students will be able to:

1. Understand the vision of IoT from the global context.
2. Determine the market perspective of IoT
3. Use of devices, gateways and data management in IoT
4. Designing the state of Architecture for IoT

UNIT-I **10 Hrs**

Introduction And Concepts: 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-II **13 Hrs**

IOT and M2M: 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-III **13 Hrs**

Developing Internet Of Things: 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-IV **12 Hrs**

Iot Physical Devices & Endpoint: 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-V **12 Hrs**

Iot Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP, AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework, Django, Designing a RESTful Web API, Amazon Web services for IoT, SkyNet IoT Messaging Platform.

TEXT BOOK:

1. Arshdeep Bahga, Vijay K.Madisetti, “Internet of Things”, A HANDS ON APPROACH, Universities Press, 2014

REFERENCE BOOKS:

1. Adrian Mcewen, Hakin Cassimally, "Designing The Internet of Things", WEILEY Publications, 2015
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, David Boyle, Stamatis Karnouskos, "From Machine-to-Machine to the Internet of Things", Academic Press, 2014

CO- PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	-	-	-	-	-	-	-	-	-	3	2
CO2	1	3	-	2	-	-	-	-	-	-	-	-	2	3
CO3	3	2	-	2	-	-	-	-	-	-	-	-	3	3
CO4	3	1	2	-	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester (Common to CSE, IT, CSE(DS), CSE (AI &ML))

L	T	P	C
3	0	0	3

20ACS46 COMPUTER VISION
(Professional Elective -V)

COURSE OUTCOMES:

1. Review image processing techniques for computer vision.
2. Understand shape and region analysis.
3. Understand Hough Transform and its applications to detect lines, circles, ellipses.
4. Implement three-dimensional image analysis techniques.
5. Design some applications using computer vision algorithms.

UNIT I IMAGE PROCESSING FOUNDATIONS **8 Hrs**

Introduction – The Nature of vision - From Automated Visual Inspection to Surveillance - Images and Imaging Operations – Image Processing Operation – Basic image filtering operations – Thresholding techniques.

UNIT II SHAPES AND REGIONS **11 Hrs**

Edge detection techniques – Corner and interest point detection – Mathematical morphology - Texture - Binary shape analysis – connectedness in Binary Images – Object labeling and counting – Size filtering – Distance functions and their uses– skeletons and thinning –Other Measure for Shape recognition - boundary trackingprocedures– Boundary Pattern Analysis – Centroidal profiles – Problems With The Centroidal Profile Approach –Accuracy of Boundary Length Measures.

UNIT III HOUGH TRANSFORM **11 Hrs**

Line detection – Application of Hough Transform (HT) for line detection – The foot-of-normal method – Longitudinal Line Localization - Final Line Fitting – Using RANSAC For Straight Line Detection– Ht based circular object detection– Location Of Laparoscopic Tools – Circle and Ellipse Detection – Hough-Based Schemes For Circular Object Detection - The Problem Of Accurate Center Location - Overcoming The Speed Problem – Ellipse Detection - Case study: Human iris Location – hole detection.

UNIT IV 3D VISION AND MOTION **10 Hrs**

3-D Vision— The Variety Of Methods – Projection Schemes For Three-Dimensional Vision – Shape from Shading – photometric stereo – The Assumption Of Surface Smoothness - shape from texture – Use Of Structured Lighting - Three-Dimensional Object Recognition Schemes - Horaud's Junction Orientation Technique - An Important Paradigm—Location Of Industrial Parts

UNIT V APPLICATIONS **9 Hrs**

Application: Automated Visual Inspection – The Process of Inspection – The Types Of Object to Be Inspected – X-Ray Inspection – Surveillance – foreground and background separation – particle filters – Use of Color Histogram for Tracking – Implementation of Particle Filters – Chamfer Matching, Tracking, And Occlusion - Combining Views From Multiple Cameras - Applications To The Monitoring Of Traffic Flow - License Plate Location – Occlusion Classification For Tracking – Distinguishing Pedestrians By Their Gait – Human Gait Analysis - Model-Based Tracking Of Animals.

TOTAL: 49 PERIODS

TEXT BOOK

1. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.

REFERENCES

1. D. L. Baggio et al., ―Mastering Open CV with Practical Computer Vision Projects‖,Packt Publishing, 2012.
2. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithmsfor analyzing images‖, O'Reilly Media, 2012.
3. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
4. R. Szeliski, ― Computer Vision: Algorithms and Applications‖, Springer 2011.
5. J. D. Prince, ― Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3							1					3	
CO2	2	2	3	2				2					2	1
CO3	2	2	2	3		2	3	1		2			1	2
CO4	2	1	3	3		3	2			3				3
C05	1			2		3	3			3				

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM23 - MACHINE LEARNING FOR ENGINEERING AND SCIENCE APPLICATIONS
(Professional Elective – V)

COURSE OUTCOMES

On completion of the course the student will be able to:

1. Explain different types of machine learning algorithms and its learning approaches.
2. Use regression and linear models for supervised learning.
3. Apply different Neural Networks for various classification problems.
4. Examine advanced machine learning algorithms for Engineering and science applications.

UNIT 1 MATHEMATICAL AND COMPUTATIONAL BASICS 9Hrs.

Introduction to Machine Learning, Linear Algebra, Probability. Computational Basics – Numerical computation and optimization, Introduction to Machine learning packages.

UNIT 2 LINEAR AND LOGISTIC REGRESSION 9Hrs.

Bias/Variance Trade-off, Regularization, Variants of Gradient Descent, MLE, MAP, Applications

UNIT 3 NEURAL NETWORKS 9Hrs.

Multilayer Perceptron, Backpropagation, Applications. Convolutional Neural Networks – CNN Operations, CNN architectures, Training, Transfer Learning, Applications. Recurrent Neural Networks RNN, LSTM, GRU, Applications

UNIT 4 CLASSICAL TECHNIQUES 9 Hrs.

Bayesian Regression, Binary Trees, Random Forests, SVM, Naïve Bayes, Applications,

k-Means, kNN, GMM, Expectation Maximization, Applications

UNIT 5 ADVANCED MACHINE LEARNING TECHNIQUES 9 Hrs.

Structured Probabilistic Models, Monte Carlo Methods, Autoencoders, Generative Adversarial Network.

Max. 45 Hrs.

TEXT/ REFERENCEBOOKS:

1. Bishop, Christopher M., and Nasser M. Nasrabadi. “Pattern recognition and machine learning”. Vol. 4. No. 4. New York: springer, 2006.
2. Deep Learning, By Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCEBOOKS:

1. Hearty, John. Advanced Machine Learning with Python. Packt Publishing Ltd, 2016.
2. Application of machine learning in industries, IBM ICE Publications
3. Machine Learning Algorithms for Industrial Applications, Studies in Computational Intelligence, Springer Book series, 2021.
4. Pedro Larrañaga, David Atienza, Javier Diaz-Rozo, Alberto Ogbechie, Carlos Esteban Puerto-Santana, Concha Bielza, Industrial Applications of Machine Learning, ISBN 9780367656874, CRC press, 1st edition, 2020

WEB REFERENCE

1. https://nptel.ac.in/courses/106106198

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**								**1**	**3**	
CO2	**3**	**2**	**2**								**1**	**3**	**2**
CO3	**3**	**2**	**1**								**1**	**2**	**3**
CO4	**3**	**2**	**2**								**1**	**2**	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM24 SMART SENSING STRUCTURES AND AI
(Professional Elective – V)

COURSE OUTCOMES
On completion of the course, student will be able to:
1. Describe the fundamentals of sensors and micromachining.
2. Identify Sensor technologies for communications systems.
3. Apply different routing protocols for Wireless Sensing Networks.
4. Analyze the adoption of smart sensor in AI applications.

UNIT 1 SMART SENSOR BASICS 9 Hrs.
Nature of Sensors, Integration of Micromachining and Microelectronics, Micromachining-Bulk Micromachining, Wafer Bonding, Surface Micromachining, The LIGA Process- Dry Etching Processes – Micromilling-Lasers in Micromachining. MEMS- software tools.

UNIT 2 SENSOR OUTPUT CHARACTERISTICS 9 Hrs.
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 Hrs.
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 Hrs.
Wireless Data and Communications- Wireless Sensing Networks- Industrial Wireless Sensing Networks- RF Sensing- Telemetry- RF MEMS- Application Example, MEMS- Actuators, Micromachined Structures, Packaging, Testing, and Reliability Implications of Smarter Sensors.

\UNIT 5 APPLICATIONS OF AI 9 Hrs.
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

Max 45hrs.

TEXT / REFERENCE BOOKS

1. Understanding smart sensors, Randy Frank, 2018
2. Artificial Intelligence and Internet of Things, Lalit Mohan Goyal, Tanzila Saba, Amjad Rehman, SouadLarabi-Marie-Sainte, 2021
3. Life 3.0, Max Tegmark, 2017

4. Smart Sensors and Devices in Artificial Intelligence, Xuechao Duan, Dan Zhang,2021.
5. Smart Sensors and Systems, HirotoYasuura, Yongpan Liu, Chong-Min Kyung,2015.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3
CO2	3	3	1									3	
CO3	3	2	2									3	
CO4	3	3	2									3	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM25 - ETHICS FOR AI
(Professional Elective – V)

COURSE OUTCOMES:

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

1. Explain the ethical issues in the development of AI agents.
2. Describe the ethical considerations of AI with perspectives on ethical values
3. Apply the ethical policies in AI based applications and Robot development
4. Analyze AI concepts to societal problems by adapting the legal concepts by securing fundamental rights.

UNIT I INTRODUCTION TO ETHICS OF AI 9

Role of Artificial Intelligence in Human Life, Understanding Ethics, Ethical Considerations of AI, Current Initiatives in AI and Ethics, Ethical Issues with our relationship with artificial Entities

UNIT II FRAMEWORK AND MODELS 9

AI Governance by Human-right centered design, Normative models, Role of professional norms, Teaching Machines to be Moral.

UNIT III CONCEPTS AND ISSUES 9

Accountability in Computer Systems, Transparency, Responsibility and AI. Race and Gender, AI as a moral right-holder

UNIT IV PERSPECTIVES AND APPROACHES 9

Perspectives on Ethics of AI, integrating ethical values and economic values, Automating origination, AI a Binary approach, Machine learning values, Artificial Moral Agents

UNIT V CASES AND APPLICATION 9

Ethics of Artificial Intelligence in Transport, Ethical AI in Military, Biomedical research, Patient Care, Public Health, Robot Teaching, Pedagogy, Policy, Smart City Ethics

TOTAL:45 PERIODS

TEXT/REFERENCES

1. Paula Boddington, "Towards a Code of Ethics for Artificial Intelligence", Springer, 2017
2. Markus D. Dubber, Frank Pasquale, Sunit Das, "The Oxford Handbook of Ethics of AI", Oxford University Press Edited book, 2020

3. S. Matthew Liao, “Ethics of Artificial Intelligence”, Oxford University Press Edited Book, 2020
4. N. Bostrom and E. Yudkowsky. “The ethics of artificial intelligence”. In W. M. Ramsey and K. Frankish, editors, The Cambridge Handbook of Artificial Intelligence, pages 316–334. Cambridge University Press, Cambridge, 2014.
5. Wallach, W., & Allen, C, “Moral machines: ceaching robots right from wrong”, Oxford University Press, 2008.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	1									2	3
CO2	3	2	3									2	3
CO3	3	2	2									3	2
CO4	3	2	2									3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester (Common to ECE, CSE, IT, CSE(DS), CSE (AI &ML))

L	T	P	C
3	0	0	3

20AEC56 - EMBEDDED SYSTEMS
(Open Elective- III)

Course Outcomes:

After successful completion of the course the student will be able to

CO1: Explain concept of embedded systems and its applications

CO2: Define various processors and explain their architecture

CO3: Design State machine and Concurrent Process Models

CO4: Identify embedded components, peripheral devices and apply various processor scheduling algorithms.

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to Embedded Systems: Definition of embedded system, history of embedded systems, classification of embedded systems, characteristics of embedded systems, major application areas of embedded systems, purpose of embedded systems , Embedded hardware units and devices in a system, Processor and OS trends in embedded systems, Core of the embedded system, memory, sensors and actuators, embedded software in a system and an overview of programming languages, examples of the embedded systems,

UNIT- II INTRODUCTION TO ASIP & DSP PROCESSORS:

Design challenge, processor technology, IC technology, Design Technology, Trade-offs. Custom Single purpose processors- RT-level combinational logic, sequential logic (RT-level), custom single purpose processor design (RT-level), optimizing custom single purpose processors. General Purpose Processors -

Basic architecture, operation- Pipelining, Programmer’s view, development environment, Application Specific Instruction-Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors.

UNIT III STATE MACHINE AND CONCURRENT PROCESS MODELS:

Introduction, models Vs. languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model, real-time systems.

UNIT IV STANDARD SINGLE PURPOSE PROCESSORS: PERIPHERALS:
Timers, counters and watch dog timers, real time clock. Communication Interface - Need for communication interfaces, RS232 / UART, RS422/ RS485, USB, Infrared, IEEE 1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT V EMBEDDED / RTOS CONCEPTS:
REAL-TIMEOPERATING SYSTEMS – Operating System Overview, Operating System - Functions, Types and Services of Operating System, Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex. Mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem.

TEXT BOOKS:

1. Frank Vahid, Tony D.Givargis,"Embedded System Design – A Unified Hardware/Software Introduction", John Wiley, 2002.
2. KVKK Prasad, "Embedded / Real Time Systems", Dream tech Press, 2005.

REFERENCE BOOKS:

1. David E. Simon, "An Embedded Software Primer", Pearson Ed., 2005.
2. Raj Kamal, "Introduction to Embedded Systems", TMS, 2002.

CO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										2	2
CO2	2		2										2	
CO3	3	2											2	2
CO4	3	2											2	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester (Common to CE, ME, CSE, CSE(DS), CSE(AI&ML), IT & EEE)

L	T	P	C
3	0	0	3

20AME54 OPTIMIZATION TECHNIQUES (Open Elective - III)

Course Outcome:

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

1. Formulate unconstrained optimization techniques in the engineering application.
2. Formulate constrained optimization techniques for various application.
3. Implement neural network technique and swarm optimization to real world design problems.
4. Apply genetic algorithms and multi objective optimization to the complex engineering problems.
5. Evaluate solutions by various optimization approaches for structural and dynamic problem.

UNIT: I Unconstrained Optimization Techniques 10 Hours

Introduction to optimum design - General principles of optimization – Problem formulation & their classifications - Single variable and multivariable optimization, Techniques of unconstrained minimization – Golden section, Random, pattern and gradient search methods – Interpolation methods.

UNIT: II Constrained optimization techniques 10 Hours

Optimization with equality and inequality constraints - Direct methods – Indirect methods using penalty functions, Lagrange multipliers - Geometric programming.

UNIT: III Artificial Neural Networks and Swarm intelligence 10 Hours

Introduction – Activation functions, types of activation functions, neural network architectures, Single layer feed forward network, multilayer feed forward network, Neural netwok applications. Swarm intelligence - Various animal behaviors, Ant Colony optimization, Particle Swarm optimization.

UNIT: IV Advanced Optimization Techniques 10 Hours

Multi stage optimization – dynamic programming; stochastic programming; Multi objective optimization, Genetic algorithms and Simulated Annealing technique.

UNIT: V Static and Dynamic Applications 10 Hours

Structural applications – Design of simple truss members – Design of simple axial, transverse loaded members for minimum cost, weight – Design of shafts and torsionally loaded members – Design of springs.

Dynamic Applications – Optimum design of single, two degree of freedom systems, vibration absorbers. Application in Mechanisms – Optimum design of simple linkage mechanisms.

Text Book(s)

1. Kalyanmoy Deb, “Optimization for Engineering Design: Algorithms and Examples”, PHI Learning Private Limited, 2nd Edition, 2012.
2. Rao Singiresu S., “Engineering Optimization – Theory and Practice”, New Age International Limited, New Delhi, 3rd Edition, 2013.

3. Rajasekaran S and VijayalakshmiPai, G.A, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2011

Reference Books

1. Goldberg, David .E, “Genetic Algorithms in Search, Optimization and Machine Learning”, Pearson, 2009.
2. Srinivasan G, “Operations Research Principles and Applications”, PHI, 2017.

Mapping of COs with POs & PSOs

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	3	3	3								3	3	2
CO-2	3	3	3	2								3	3	2
CO-3	3	3	3	3								3	3	2
CO-4	3	3	3	3								3	3	2
CO-5	3	3	2	2								1	3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. TECH I-SEMESTER (Common to CSE, CSE(DS), CSE (AI &ML))

L	T	P	C
3	0	0	3

20AMB10 - INDUSTRIAL MARKETING
(Open Elective - III)

Course Outcomes

After completion of the course, the students will be able to

1. Describe key concepts of industrial marketing.
2. Prepare proper segmentation and positioning for various industrial products.
3. Formulate robust marketing strategies for variety of situations in Indian and global context.
4. Apply and integrate Business-to-Business marketing theory with practice in a business context.
5. Explain the industrial marketing mix strategies apply this knowledge to real cases.

UNIT-I: The Industrial Marketing system and the Industrial Marketing concept, Industrial goods demand and product characteristics market levels and product types, the industrial customer, buyer motives business and institutional buyers.

UNIT-II: Organizational Buying: BUYGRID MODEL, phases in purchasing decision process & their marketing implications, Buying centers, value analysis & vendor analysis.

UNIT-III: Industrial market segmentation, bases for segmenting industrial market-macro and micro variables. Targeting the industrial product, positioning the industrial product. Industrial product life cycle, product mix, Service component the provision of parts, technical assistance, terms of sales.

UNIT – IV: The distribution channel component—Industrial distributors, Formulation of channel strategy-conditions influencing channel structure. Brief introduction to Marketing Logistics. The price component-conditions affecting price competition, cost factor, the nature of demand, pricing policies.

UNIT –V: The promotional component, advertising functions-establishing recognition, supporting and motivating salesmen and distributors measurement of advertising effectiveness. Personal selling-Personnel profiles selection and training, supervisions compensation sales promotion and public relations-Trade shows and exhibits, promotional novelties.

TEXT BOOKS:

1. Havaldar, K. K. (2005). Industrial Marketing: Text and Cases. India: Tata McGraw-Hill.
2. Phadtare, M. T. (2014). Industrial Marketing. India: PHI Learning.
3. Govindarajan, M. (2009). Industrial Marketing Management. India: Vikas Publishing House Pvt Limited.

REFERENCES:

1. Stacey, N., Wilson, A. (2014). Industrial Marketing Research (RLE Marketing): Management and Technique. United Kingdom: Routledge.
2. Chisnall, P. M. (1985). Strategic Industrial Marketing. United Kingdom: Prentice-Hall.
3. Brierty, E. G., Reeder, B. H., Reeder, R. R. (1991). Industrial Marketing: Analysis, Planning, and Control. United Kingdom: Prentice-Hall International.

CO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	1	-	1	1	2
CO2	2	-	-	-	-	-	-	-	-	1	-	1	2	2
CO3	-	3	3	3	2	-	-	-	-	-	-	-	1	3
CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	2
CO5	2	-	2	-	2	-	-	-	-	-	-	-	1	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech I Semester (Common to CSE, CSE(DS), CSE (AI & ML)

L	T	P	C
3	0	0	3

20ACS47 - NoSQL DATABASES
(Job Oriented Elective – III)

Course outcome:

After completion of the course, the students will be able to

1. Execute the application and Integration of NoSQL Databases
2. Explain performance tune of Key-Value Pair NoSQL databases.
3. Apply Nosql development tools on different types of NoSQL Databases
4. Develop basic applications using NoSQL

UNIT-I **9Hrs**

NoSQL, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration. Aggregate Data Models, Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access.

UNIT-II **8Hrs**

Distribution Models: Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

Consistency: Update Consistency, Read Consistency, Relaxing Consistency, The CAP Theorem, Relaxing Durability, Quorums.

UNIT-III **10Hrs**

Map-Reduce, Basic Map-Reduce, Partitioning and Combining, Composing Map-Reduce Calculations, A Two Stage Map-Reduce Example, Incremental Map-Reduce

Document Database: Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT-IV **8Hrs**

Introducing MongoDB, MongoDB Design Speed, Scalability, and Agility , Non-Relational Approach JSON-Based Document Store, Performance vs. Features, Running the Database Anywhere

The MongoDB Data Model :The Data Model, JSON and BSON, The Identifier, Capped Collection, Polymorphic Schemas, Object-Oriented Programming, Schema Evolution.

Using MongoDB Shell: Basic Querying, Create and Insert, Explicitly Creating Collections, Inserting Documents Using Loop, Inserting by Explicitly Specifying _id , Update, Delete, Read, Using Indexes, Stepping Beyond the Basics, Using Conditional Operators, Regular Expressions, Map Reduce, aggregate( ), Designing an Application's Data Model, Relational Data Modeling and Normalization, Mongo DB Document Data Model Approach.

UNIT-V **6Hrs**

MongoDB Architecture Core Processes,Mongod, mongo, mongos MongoDB Tools, Standalone Deployment,Replication, Master/Slave Replication, Replica Set, Implementing Advanced Clustering with Replica Sets, Sharding, Sharding Components, Data Distribution Process, Data Balancing Process.

Text book:

Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.

Reference Books:

Meier, Andreas, and Michael Kaufmann. SQL & NoSQL databases. Springer Fachmedien Wiesbaden, 2019.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	2
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (Common CSE (AI&ML)), CSE, IT)

L	T	P	C
3	0	0	3

20ACM26 - MACHINE LEARNING TOOLS AND TECHNIQUES
(Job Oriented Elective – III)

COURSE OUTCOMES
On completion of the course, student will be able to
1. Describe the basics of Data mining process and machine learning models.
2. Use different knowledge representation techniques.
3. Apply different validation and selection models to improve the performance.
4. Analyze different machine learning tools for implementing real-world applications.

UNIT 1 INTRODUCTION 9Hrs.
Fielded Applications, The Data Mining Process, Machine Learning and Statistics, Generalization as Search, Data Mining and Ethics, Input: concepts, instances, attributes, Preparing the Input, output: Knowledge representation- Tables, Linear Models, Trees, Rules, Instance-Based Representation, Clusters.

UNIT 2 KNOWLEDGE REPRESENTATION 9Hrs.
Tables, Linear Models, Trees, Rules, Instance-Based Representation, Clusters, Algorithms: the basic methods, Inferring Rudimentary Rules, Simple Probabilistic Modeling, Divide-and-Conquer: Constructing Decision Trees, Covering Algorithms: Constructing Rules, Mining Association Rules, Linear Models, Instance-Based Learning, Clustering, Multi-Instance Learning.

UNIT 3 CREDIBILITY 9Hrs.
Training and Testing, Predicting Performance, Cross-Validation, Other Estimates, Hyperparameter Selection, Comparing Data Mining Schemes Predicting Probabilities, Counting the Cost, Evaluating Numeric Prediction, The Minimum Description Length Principle, Applying MDL to Clustering, using a Validation Set for Model Selection.

UNIT 4 TREES AND RULES 9Hrs.
Decision Trees, Classification Rules, Association Rules, extending instance-based and linear models- Instance-Based Learning, Extending Linear Models, Numeric Prediction with Local Linear Models, WEKA Implementations. Data transformations- Attribute Selection, Discretizing Numeric Attributes, Projections, Sampling, Cleansing, Transforming Multiple Classes to Binary Ones, Calibrating Class Probabilities.

UNIT 5 MACHINE LEARNING TOOLS 9Hrs.
Knime, Accord. net, Scikit-Learn, TensorFlow, Pytorch, RapidMiner, Google Cloud AutoML, Jupyter Notebook, Apache Mahout, Azure Machine Learning studio, MLLIB, Orange3, IBM Watson, Pylearn2

Max.45Hrs.

TEXT/REFERENCEBOOKS

1. Datamining machine learning tools and techniques, Chris Pal, Ian Witten, Eibe Frank, Mark Hall, 2011.
2. Machine Learning the art of science and algorithms that make sense of data, peter, flach,2012.
3. Machine Learning for Absolute Beginners, Oliver Theobald,2021.
4. Interpretable Machine Learning, Christoph Molnar,2020.
5. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall,2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	3	-
CO2	3	2	2	-	-	-	-	-	-	-	-	3	2
CO3	3	1	1	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	2	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
IV B. Tech I Semester (Common to ECE, CSE, IT, CSE(AI&ML), CSE(DS))

L	T	P	C
3	0	0	3

20AEC51 - DIGITAL IMAGE PROCESSING
(Open Elective/Job Oriented Elective IV)

Course Outcomes:
After successful completion of the course the student will be able to
CO1: Explain fundamentals of Digital Image Processing
CO2: Analyze image transforms and enhancement
CO3: Apply various coding and segmentation techniques in image processing

UNIT-I FUNDAMENTALS OF DIGITAL IMAGE PROCESSING:
Digital Image representation – Digital image processing System –Visual Perception-Sampling and Quantization - Basic relationships between pixels, and imaging geometry.

UNIT-II IMAGE TRANSFORMS:
Discrete Fourier Transform – Properties of 2 – D Fourier Transform – Fast Fourier Transform, Walsh, Hadamard, Discrete cosine transforms.

UNIT-III IMAGE ENHANCEMENT:
Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, gray level Transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering, Enhancement in frequency Domain, Image smoothing, Image sharpening, Color images
Image Restoration: Degradation model, Algebraic approach to restoration – Inverse filtering–Least Mean Square filters, Constrained Least square restoration

UNIT-IV IMAGE CODING:
Fidelity criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

UNIT-V IMAGE SEGMENTATION:
Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation

TEXT BOOKS:

1. R. C .Gonzalez & R.E. Woods, "Digital Image Processing", Addison Wesley/Pearson education, 3rd Edition, 2010.
2. A .K. Jain, "Fundamentals of Digital Image processing", PHI.

REFERENCE BOOKS:

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, “Digital Image processing using MATLAB”, Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”,Tata McGraw Hill. 2010.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1										2	-
CO 2	2	1	2	2									2	1
CO 3	3	1											2	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. TECH I-SEMESTER (Common to CSE, IT, CSE(DS), CSE (AI & ML)

III B. Tech I Semester (Common to ME, ECE)

L	T	P	C
3	0	0	3

20AME20 - TOTAL QUALITY MANAGEMENT AND RELIABILITY ENGINEERING (Open Elective- IV)

Course Outcome:

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

1. Develop action plans for customer centric business on the basis of various quality philosophies.
2. Select the best solution for problem solving using QC tools, QFD model, JIT method.
3. Solve industry problems with available sources, software tools, modern TQM techniques with system approach.
4. Establish quality management system and environmental management system for product and service industries.
5. Design systems with a focus on enhancing reliability and availability.

UNIT: I Introduction 10 hours

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality, Employee involvement, Quality Awards.

UNIT: II TQM Principles 10 hours

Quality circles - PDCA cycle, Control Charts - Process Capability – Problem solving - Quality Function Development (QFD) - Taguchi quality loss function – Total Productive Maintenance - Concepts, improvement needs - Performance measures. Poka-yoke, Kaizen, JIT, Terotechnology.

UNIT: III TQM Tools and Technique 10 hours

The seven traditional tools of quality - New management tools - Six sigma: Concepts, DMAIC, Methodology, applications to manufacturing, service sector including IT - Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Fault tree analysis.

UNIT: IV Quality Systems 11 hours

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Accounting Systems, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

UNIT: V Fundamental concepts of Reliability 10 hours

Reliability definitions, failure, failure density, failure Rate, hazard rate, Mean Time to Failure (MTTF), Mean Time Between Failure (MTBF), maintainability, availability, safety and reliability, product liability, importance of reliability. Problem solving. Business process re-engineering (BPR) –principles, applications.

Textbooks

1. Dale H. Besterfiled, et at., "Total quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2006
2. Dr.K.C.Arora, "Total Quality Management", 4th Edition, S. K. Kataria& Sons, 2009.

Reference Books

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.

CO-PO Mapping:

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3					3	3				1		3	0
CO2	3	3				3	3				1		3	3
CO3	3	3				3	3				1		3	3
CO4	3					3	3				1		3	3
CO5	3					3	3				1		3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
IV B. TECH I-SEMESTER (Common to CSE, IT, CSE(AI&ML), CSE(DS))

L	T	P	C
3	0	0	3

20AMB11 - SOCIAL MEDIA MARKETING
(Open Elective - IV)

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

1. Explain the required terminology and components of social media tactical and strategic plans.

2. Identify the place social media marketing has within the context of an organizations/business unit's/product's overall marketing strategy.

3. Evaluate an organizations effective engagement in social media to meet marketing objectives.

4. Measure the effectiveness of social media for marketing purposes and draft a social media strategy for a specific product.

5. Evaluate customer satisfaction level.

UNIT-I: INTRODUCTION: social media, Historical Evolution of Social Media Marketing; Understanding the concept of social media; Increasing Visibility, Engagement; Bringing Targeted traffic; Converting traffic into leads; Understanding conversion process;

UNIT-II: CONTENT MARKETING–I: Developing a Content Marketing Strategy, Content Strategies- Building audience; Facebook: Creating groups and pages - Posts – Events - Ad campaigns – Objective, Managing Audience, Budget, scheduling and Ad Delivery; Twitter: Microblogging; Creating campaignson Twitter –Clients- Set-up and usage – Tips.

UNIT–III: CONTENT MARKETING–II: Blogs: Introduction – History – Blogging; Forums; Ratings and Reviews;Introduction to SEO: What is SEO? History and Growth of SEM; How it is determined? Introduction to Google Ad wordsand PPC; YouTube: Long-form video platforms- Setting up a channel - Managing content.

UNIT–IV: TRENDS IN SOCIAL MEDIA MARKETING: LinkedIn: Promoting Business with LinkedIn; Using LinkedIn as a Content Platform; Instagram: Create and Usage; Brand advertising on Instagram; Pinterest: Set-up and management – Driving traffic with Pinterest.

UNIT-V: MEASURING RESULTS: Metrics – Goal Setting; Analyzing Content-Sharing Metrics; Analyzing Twitter & Face book Metrics; Measuring Other Social Media Networks. ROI: Measuring ROI – Financial - Customer Satisfaction – Awareness.

TEXT BOOKS:

1. Jan Zimmerman, Deborah Ng, Social Media Marketing All-in-One For Dummies,3rd Edition, John Wiley and Sons, 2015.

2. Dan Zarella, The Social Media Marketing, O'Reilly Media, 2011, ISBN: 978-0-596-80660-

REFERENCES:

1. Erik Qualman, Socialnomics: How Social Media Transforms the Way We Live and Do Business -2nd Edition, 978-1118232651.

2. Eric Schwartzaman, Social Marketing to the Business Customer: Listen to Your B2B Market, Generate Major Account Leads, and Build Client Relationships, John Wiley & Sons, 978- 0470639337.

3. Dave Evans, Social Media Marketing, The Next Generation of Business Engagement.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	3	-	2	2
CO2	-	-	-	-	-	-	-	-	-	-	3	-	2	1
CO3	-	-	-	-	-	-	-	-	-	-	3	-	2	1
CO4	-	-	-	-	-	-	-	-	-	-	3	-	2	1
CO5	-	-	-	-	-	-	-	-	-	-	3	-	1	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
IV B. Tech I Semester (Common to CSE, CSE (AI & ML))

L	T	P	C
3	0	0	3

20ACS49 - DEVOPS
(Job Oriented Elective – IV)

COURSE OUTCOMES
On completion of the course the student will be able to
1. Explain the DevOps Principles and Life Cycle.
2. Use Agile software methodology for faster development.
3. Describe the characteristics and cloud service models.
4. Apply GIT command tools for configuration management.
5. Analyze different deployment and monitoring tools

UNIT 1 INTRODUCTION TO DevOps **9 Hrs.**
Introduction to DevOps - DevOps vs Agile - DevOps Principles and Life Cycle - Introduction to CI / CD & DevOps Tools-Version Control - Build Automation - Configuration Management- Containerization-- Continuous Deployment - Continuous Integration - Continuous Testing -Continuous Monitoring.

UNIT 2 AGILE SOFTWARE DEVELOPMENT **9 Hrs.**
Software Development- using Extreme Programming - Roles & Rules - Software Development using Scrum Framework - Scrum team - Sprints - Sprints planning - Metrics - Scrum tools - Case Studies.

UNIT 3 CLOUD COMPUTING AND AWS **9Hrs**
Cloud computing -Characteristics of cloud computing - Cloud implementation models - Cloud service models - Elastic Cloud Computing - Simple Storage Service - Elastic Block Storage - Elastic Load Balancer - Auto Scaling - Identity Access Management -Relational Database Server.

UNIT 4 GIT AND CONFIGURATION MANAGEMENT TOOL **9 Hrs.**
GIT Basics-Different Git tools - Git Installation and Configuration - Setting up Git Bash and Git UI -GIT commands -Configuration Management Tool: Overview of Chef-Workstation Setup - Organization Setup- Test Node Setup -Puppet Architecture -Installation and Configuration.

UNIT 5 DEPLOYMENT AND MONITORING TOOL **9 Hrs.**
Deployment Tool - Jenkins - Build Cycle - Jenkins Architecture-Installing and configuring Jenkins using WAR and RPM-Securing Jenkins- Dockers vs Virtualization - Docker Architecture - Docker Networking- Monitoring tool - About New Relic - Installing and Configuring New Relic - Application Monitoring using New Relic - Server Monitoring using New Relic - Alerts policies.

Max. 45 Hrs.

TEXT /REFERENCE BOOKS

1. KalloriVikram, —Introduction to DevOps, 1 st Edition, KalloriVikram Publication, 2016.
2. Jaokim Verona, —Practical DevOps, 2 nd Edition, Packt. Publication, 2018.
3. Stephen Fleming, Pravin, —DevOps Handbook: Introduction of DevOps Resource Management—,1st Edition, Createspace Independent Pub., 2010.
4. Len Bass, Ingo Weber, Liming Zhu, G., —DevOps: A Software Architect's Perspective, 1st Edition, Addison-Wesley Professional, 2015.
5. Alistair Cockburn, "Agile Software Development", 2nd ed, Pearson Education, 2007.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2		2								3
CO2	3	2	2	2	1							2	1
CO3	3	3	2	1	2							2	2
CO4	3	3	3		3								3
CO5	3	2	2		2								3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	0	0	3

20ACM27 - HASKELL PROGRAMMING

(Job Oriented Elective – IV)

COURSE OUTCOMES

After completion of the course the student will able to do

1. Explain the fundamentals and programming structure of the Haskell Programming.
2. Use the concepts of data models, operators and Environmental setup.
3. Apply the different types, type classes, functions and methods.
4. Apply the various the functions, modules, type checking & algebraic type.

UNIT I – INTRODUCTION TO HASKELL PROGRAMMING 9

Introduction to Haskell Programming – Functionality of Haskell – Print Hello world - Types of Haskell Programming – Environmental Setup for various operating systems - Modules of Programming, sample programs – currying - Get Started with Haskell and Hugs - The standard prelude and the Haskell libraries - Modules - Errors and error messages - Overloading – Recursion - Primitive recursion

UNIT II – DATA TYPES: TUPLES AND LISTS 9

Data Types: Tuples and Lists - Introducing tuples, lists and strings – Tuple types - Our approach to lists - Lists and list comprehension - Generic functions: polymorphism - Haskell list functions in Prelude. hs - The string type - Programming with lists - Local definitions - Lists and list patterns- Primitive recursion over lists - General recursions over list - Generalization: patterns of computation.

UNIT III – FUNCTIONS AND OVERLOADING 9

Functions and Overloading: Function-level definitions – Function composition – Functions as values and results – Partial application - Currying and uncurrying - Example: creating an index – Verification and general functions – Overloading and type classes – Why overloading? - Signatures and instances– Types and classes.

UNIT IV – TYPE CHECKING & ALGEBRAIC TYPE **9**

Checking Types – Monomorphic type checking – Polymorphic type checking – Type checking and classes – Algebraic Types: Introducing algebraic type – Recursive algebraic types - Polymorphic algebraic types, Design with algebraic data types - Algebraic types and type classes - Reasoning about algebraic types.

UNIT V - ABSTRACT DATA TYPES **9**

The Haskell abstract data type mechanism – Queues, Design – Simulation – Implementing the simulation – Sets - Relations and graphs – Lazy programming: Lazy evaluation – List comprehensions revisited - Infinite lists.

Text Books:

1. Haskell Programming: The Craft of Functional Programming Second Edition, Simon Thompson – Addison Wesley – A Pearson Edition 2006.

Reference Books:

1. Programming in Haskell: A book by Graham Hutton, Cambridge University Press -2007.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		2								3	3
CO2	3	3	3		3								3	2
CO3	3	3	3	1	3									3
CO4	3	3	3		3								3	

3 – High Mapping **2 – Medium Mapping** **3 – Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. TECH I-SEMESTER (Common to CSE(AI&ML), CSE(DS))

II B. TECH I SEMESTER CSE

L	T	P	C
1	0	2	2

20ACS11 - ANDROID APPLICATION DEVELOPMENT
(Skill Course)

Course Outcomes:

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

1. Create, test and debug Android application by setting up Android development Environment
2. Implement adaptive, responsive user interfaces that work across a wide range ofDevices.
3. Demonstrate methods in preferences and settings and storing data in Android applications.
4. Demonstrate methods in sharing and loading data in Android Applications.

Lab Task

Task1- Create a basic app to display the student details as Name, Roll No, Section and Phone No

Task2 -Create an application that takes the name from a text box and shows hello message alongwith the name entered in text box, when the user clicks the OK button.

Task3-Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout)

Task4- Design an android application Send SMS using Intent

Task5-Develop an Android application using controls like Button, Text View, Edit Text for designing a calculator having basic functionality like Addition, Subtraction, Multiplication and Division.

Task6 – Develop an application to set an image as wallpaper. On click of a button, the wallpaper image should start to change randomly every 30 secs.

Task7- Create a user registration application that stores the user details in a database table.

Task 8- Develop a simple application with one EditText so that user can write some text in it. Createa button called “Convert Text to Speech” that converts the user input text to voice.

Text Books:

1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference”, Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developerfundamentals- Course-concepts/details (Download pdf file from the above link).

Reference Books:

1. Erik Hellman, “Android Programming – Pushing the Limits”, 1st Edition, Wiley India Pvt Ltd, 2014.
2. Dawn Griffiths and David Griffiths, “Head First Android Development”, 1st Edition,O’Reilly SPD Publishers, 2015.
3. J F DiMarzio, “Beginning Android Programming with Android Studio”, 4th Edition,Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
4. Anubhav Pradhan, Anil V Deshpande, “Composing Mobile Apps” using Android, Wiley 2014, ISBN: 978-81-265-4660-2

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3								3	1
CO2	3	1	3		3								3	1
CO3	3		3		3								-	2
CO4	3	2			3								3	

3-High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech I Semester (Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML) & CSE(DS))

L	T	P	C
2	0	0	0

20AMB12 - PROFESSIONAL ETHICS
(Mandatory Course)

Outcomes:

After completion of this course students will be able to:

1. Identify and analyze an ethical issue in the relevant field.
2. Apply specific ethical theories to current social issues.
3. Identify significant problems in contemporary professional ethics.
4. Explain the ethical roles of engineers in industry and society.
5. Explain moral and ethical obligations toward the environment.

UNIT I INTRODUCTION: Professionalism-models of professionalism-Ethics-Types of ethics and morality-Engineering ethics-Positive and negative faces of ethics-Responsibility for safety-Technology pessimism and perils of technological optimism.

UNIT II ETHICAL CONCEPTS: Human Values – morals-integrity-work ethics-Respect for others-respect for authority-conflicts of interests-moral dilemmas-honesty- courage-cooperation-valuing time-commitment-collegiality-loyalty-self -interest-Professional accountability-royalty-Problem of bribery, extortion and grease payments-problem of nepotism, excessive gifts-confidentiality-uses of ethical theories-Kohlberg's Theory-Gilligan`s Theory-Ethical codes of IEEE and Institution of Engineers.

UNIT III ENGINEERS ROLE IN SAFETY: Safety and risks-risk and costs-risk benefit analysis-Testing methods for safety-The promise of technology-Computer Technology Privacy-Social Policy-Engineering standards-the standards care-Social and value dimensions of technology-communicating risk and public policy-occupational crime-professional rights and employee rights-whistle blowing.

UNIT IV ROLES OF ENGINEERS: Engineers as managers, Advisors, Consultants, Experts and witnesses- Engineers role in industry and society- models of professional roles-Theories about right action-paternalism-different business practices-Moral leadership- Cases - Bhopal gas tragedy, Nuclear power plant disasters.

UNIT V ENVIRONMENTAL ETHICS: Global Issues-Multinational corporations-Living in harmony with NATURE-Holistic technology-Eco friendly production system-sustainable technology and development-weapon development-Four orders of living, their interconnectedness-Eco system-Ozone depletion-pollution

Text Books:

1. Subramanian R, Professional Ethics,1st Edition, Oxford University Press. 2013.
2. Naagarazan , R.S., A Textbook on Professional Ethics and Human Values,1st edition, New Age International (P) Limited, Publishers New Delhi.,2014

3. R. R. Gaur, R. Sangal and G. P. Bagaria, Human Values and Professional Ethics:,EecelBooks,New Delhi.2010.

Reference Books:

1. Fundamentals of Ethics for scientists and Engineers, Edmond G Seebauer and Robert L. Barry, 1st edition Oxford University Press, 2008.
2. Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi.
3. Professional Ethics and Human Values: Prof. D.R. Kiran, TATA McGraw Hill Education, 2007.
4. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall.
5. Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning.

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											2	3	2
CO2	3	2		1	1		1				3	2	2	1
CO3	3	2	1	1	1		1				3		2	2
CO4			1	3		1		3			3	2	1	1
CO5			1	3	1	1	1	3			3		1	1

HONORS DEGREE: Students has to acquire 20 credits with minimum one subject from each pool @ 4 credits per subject.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester-CSE[AI&ML]

L	P	T	C
4	-	-	4

20ACS53 **REAL TIME SYSTEMS**
[HONORS DEGREE – POOL I]

Course Outcomes:

At the end of the subject, students will be able to:
1. Understand the features of Real Time System
2. Analyze the different processor scheduling and Task assignment
3. Understand the various real time protocols
4. Analyze the difference between traditional and real time database
5 Demonstrate the function of real time system function using tools

UNIT I **7hrs**

Introduction to real-time computing - Structure of a real-time system - Characterization of real-time systems and tasks - Performance measures

UNIT II **7hrs**

Task Assignment and Scheduling -Task Assignment and Scheduling - Uniprocessor scheduling algorithms - Task assignment - Mode changes - Fault tolerant scheduling.

UNIT III **8hrs**

Real Time Communication Real-time Communication - Network topologies and architecture issues - Protocols - Contention-based, token-based, polled bus - Fault tolerant routing.

UNIT IV **8 hrs**

Real Time Databases Real-time Databases - Transaction priorities and aborts - Concurrency control issues - Scheduling algorithms - Two-phase approach to improve predictability.

UNIT V **7hrs**

Programming Languages and Tools Programming Languages and Tools - Hierarchical decomposition - Run-time error handling - Overloading - Timing specification - Recent trends and development

Text books:

1. C. M. Krishna and Kang G. Shin, "Real-Time Systems", International Edition, McGraw HillCompanies, Inc., New York, 1997

Reference books:

1. Rajib Mall, "Real-Time Systems: Theory and Practice", 1st edition, Pearson Education, 2012

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012	PS01	PSO2
CO1	**3**	**2**											**3**	
CO2	**3**	**2**												**3**
CO3	**3**	**3**			**3**								**2**	
C04	**3**	**3**	**1**											**3**
C05	**3**	**3**	**2**	**2**	**3**								**3**	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester-
CSE[AI&ML]

L	P	T	C
4	-	-	4

20ACS54 SOFT COMPUTINNG AND NEURAL NETWORKS
[HONORS DEGREE – POOL I]

Course Outcomes:

After completion of course, students would be able to:

1. Understand the fundamentals concepts of soft computing and fuzzy logic.
2. Apply the knowledge of fuzzy rules and reasoning to develop decision making system.
3. Design a suitable neural network model for real time problems.
4. Apply different optimization techniques to solve various complex problems.
5. Perform various analysis on real time application using analysis tools

UNIT I **7hrs**

INTRODUCTION TO SOFT COMPUTING AND NEURALNETWORKS:

Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

UNIT II **8hrs**

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT III **9hrs**

NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

UNIT IV **8hrs**

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

UNIT V **9hrs**

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Studyof neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

TEXT BOOK:

1.Abraham Silberschatz , Peter B. Galvin, Greg Gagne," *Operating System Concepts*," John Wiley and Sons**,** Eighth Edition, 2009.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012	PS01	PSO2
CO1	**3**	**2**											**3**	
CO2	**3**	**3**	**2**										**3**	
CO3	**3**	**2**	**3**	**1**									**3**	**1**
C04	**3**	**3**											**3**	
C05	**3**	**3**			**3**								**3**	**3**

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester-CSE[AI&ML]

L	P	T	C
4	-	-	4

20ACS55 ADVANCED DATABASES
[HONORS DEGREE – POOL I]

Course Outcomes:
At the end of the course, the students would be able to
1. Understand and apply the knowledge of object oriented database concepts to handle complex data structures.
2. Identify appropriate XML schema for query processing and query optimization.
3. Distinguish the features, schemas and processing commands for advanced databases.
4. Analyse various issues in designing databases for Spatial, Temporal and multimedia data.

UNIT I **8hrs**

Object Based Databases: Overview - complex Data Types - Structured Types and Inheritance in SQL - Table Inheritance - Array and Multiset Types in SQL – Object-Identity and Reference Types in SQL - Implementing O-R features - Persistent Programming Languages - Object Relational Mapping - Object Oriented versus Object Relational.

UNIT II **9hrs**

XML: Motivation - Structure of XML data - XML Document schema - Querying and Transformation - Application Program Interface to XML - Storage of XML data - XML applications.

UNIT III **8hrs**

Query processing: Overview - Measures of Query Cost - Selection operating - sorting - Join operation - Other Operations - Evaluation of Expressions.

Query Optimization: Overview - Transformation of Relational Expressions - Estimating Statistics of Expressing Results - Choice of Evaluation plans - Materialized Views.

UNIT IV **9 hrs**

Parallel Databases: Introduction - I/O Parallelism - Interquery Parallelism – Interquery Parallelism- Interoperation Parallelism - Query Optimization - Design of Parallel Systems.

Distributed Databases: Homogenous and Heterogeneous Databases - Distributed data storage- Distributed Transactions - Commit Protocols - concurrency Control in Distributed Databases –

Availability - Distributed Query Processing - Heterogeneous Distributed Databases - cloud Based Databases - Directory systems.

UNIT V **8hrs**

Advanced Application development: - Performance Benchmarks - Other Issues in Application Development – Standardization.

Spatial and Temporal Data and Mobility: Motivation- Time in Databases - spatial and Geographical Data - Multimedia Databases - Mobility and Personal databases.

TEXT BOOKS:

1. Abraham Silbershatz, Henry F Korth, S Sudharshan, "Database System Concepts", McGrawHill International Edition, Sixth Edition,2010.
2. R.Elmasri, S.B.Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", Pearson Education, Fourth Edition, 2006.

REFERENCE BOOKS:

1. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education,2006.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition2004.
3. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education,2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012	PS01	PSO2
CO1	3	3											3	
CO2	3	3											3	
CO3	3	3											3	
C04	3	3	2										3	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech II Semester- CSE[AI&ML]

L	P	T	C
4	-	-	4

20ACS56 **NATURAL LANGUAGE PROCESSING [HONORS DEGREE – POOL I]**

Course outcomes:

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

1. Identify the basic principles and process techniques to for Natural Language Processing(NLP).
2. Demonstrate state-of-the-art transformation techniques for text-based processing
3. Perform various text representation techniques for data analysis using text processingtools.
4. Apply the syntactic and semantic correctness of text using sentence structures.
5. Apply various analysis and problem-solving techniques on NLP based applications.

UNIT I **7hrs**

Introduction to various levels of natural language processing, Ambiguities and computational challenges in processing various natural languages. Introduction to Real life applications of NLP such as spell and grammar checkers, information extraction, question answering, and machine translation.

UNIT II **8hrs**

Character Encoding, Word Segmentation, Sentence Segmentation, Introduction to Corpora, Corpora Analysis.

Inflectional and Derivation Morphology, Morphological Analysis and Generation using finite state transducers.

UNIT III **7hrs**

Introduction to word types, POS Tagging, Maximum Entropy Models for POS tagging, Multi-word Expressions. The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models.

UNIT IV **7hrs**

Introduction to phrases, clauses and sentence structure, Shallow Parsing and Chunking, Shallow Parsing with Conditional Random Fields (CRF), Lexical Semantics, Word Sense Disambiguation, WordNet, Thematic Roles, Semantic Role Labelling with CRFs.

UNIT V **8hrs**

NL Interfaces, Text Summarization, Sentiment Analysis, Machine Translation, Question answering. Recent Trends in NLP

Text Books:

1.DanielJurafsky and James H. Martin "Speech and Language Processing", 3rd edition, Prentice Hall, 2009.

Reference Books:

1. Chris Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", 2nd edition, MITPress Cambridge, MA, 2003.
2. NitinIndurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.
3. James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012	PS01	PSO2
CO1	3	2											3	
CO2	3	2											3	
CO3	3	3			3								3	3
C04	3	3	1											
C05	3	3	2	2	3								3	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM30 - AI: KNOWLEDGE REPRESENTATIONS AND REASONING [HONORS DEGREE – POOL II]

COURSE OUTCOMES

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

1. Describe the key concepts of AI based Knowledge Representation.
2. Use various ontological categories for substantial and non- substantial entities.
3. Apply Knowledge representation for understanding Natural language semantics.
4. Analyze fuzzy logic and process for reasoning contexts.

UNIT I: KEY CONCEPTS AND 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 II ONTOLOGY 9

Ontological categories, Philosophical background, Top-level categories, describing physical entities, Defining abstractions, Sets, Collections, Types and Categories, Space and Time

UNIT III: KNOWLEDGE REPRESENTATIONS 9

Knowledge Engineering, Representing structure in frames, Rules and data, Object-oriented systems, Natural language Semantics, Levels of representation

UNIT IV: 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 V: KNOWLEDGE SOUP 9

Vagueness, Uncertainty, Randomness and Ignorance, Limitations of logic, Fuzzy logic, Nonmonotonic 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: 45 PERIODS

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 on April 30, 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 the Cyc Project. Addison-Wesley. ISBN 978-0201517521.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2									2	2
CO2	3	3	2									2	1
CO3	3	2	1									2	1
CO4	3	2	1									3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM31 - SECURITY ASSURANCE AND EVALUATION
[HONORS DEGREE – POOL II]

COURSE OUTCOMES
On completion of the course, student will be able to
1. Explain the basics of information technology and security techniques.
2. Identify the security functional requirements.
3. Apply the security assurance requirements.
4. Apply and validate the protection profile and target the criteria of security.
5. Analyze the Security evaluation techniques.

UNIT 1 INTRODUCTION AND GENERAL MODEL 9Hrs.
Scope, Over view, General Model - Security Context, Common Criteria approach, Security concepts, CC descriptive material, Types of evaluation, Common Criteria requirements and evaluation results.

UNIT 2 SPECIFICATION AND SECURITY REQUIREMENTS 9Hrs.
Specification: Common Criteria project (informative), Specification of Protection Profiles, Specification of Security Targets. Security Functional Requirements: Scope, Security functional components - Over view, Component catalogue, Class FAU: Security audit- Security audit automatic response, Security audit data generation, Security audit analysis, Security audit review, Security audit event selection, Security audit event storage.

UNIT 3 SECURITY ASSURANCE REQUIREMENTS 9Hrs.
Class FCO: Communication, Class FCS: Cryptographic support, Scope, Security assurance requirements - Structures, Component taxonomy, Protection Profile and Security Target evaluation criteria class structure, Usage of terms in ISO/IEC 15408-3, Assurance categorization, Assurance class and family overview, Maintenance categorization, Maintenance of assurance class and family overview

UNIT 4 PROTECTION PROFILE AND SECURITY TARGET 9Hrs.
Overview, Protection Profile criteria overview, Security Target criteria overview, Class APE: Protection Profile evaluation- Class APE: Protection Profile evaluation, Security environment, PP introduction, Security objectives, IT security requirements. Explicitly stated IT security requirements.

UNIT 5 SECURITY EVALUATION 9Hrs.
Class ASE: Security Target evaluation, Evaluation assurance levels, Assurance classes, families, and components, Class AVA: Vulnerability assessment, Class AMA: Maintenance of assurance

Max. 45 Hrs.

TEXT / REFERENCES BOOK

1.Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-1, First edition 1999-12-01 — Part 1: (UNIT 1, UNIT 5)

2.Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-2, First edition 1999-12-01 — Part 2: (Unit 2)

3.Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-3, First edition 1999-12-01 — Part 3: (UNIT 1, UNIT 5) Information Technology Security Evaluation Criteria (ITSEC) by IBM ICE Publications.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2									3	2
CO2	3	2	2									3	1
CO3	3	2	1									3	3
CO4	3	3	1									2	2
CO5	3	2	2									2	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM32 - SYSTEM MODELING AND SIMULATION
[HONORS DEGREE – POOL II]

COURSE OUTCOMES:
On completion of the course, student will be able to
1. Identify the components of continuous and discrete systems and simulate them.
2. Describe the need for statistical models' system simulation.
3. Apply the simulated data using queuing systems and validate.
4. Analyze the simulation methods and select the suitable technique on the problems

UNIT 1 INTRODUCTION TO SIMULATION 9 Hrs.
Introduction – Simulation Terminologies - Application areas - Model Classification - Types of Simulation - Steps in a Simulation study - Concepts in Discrete Event Simulation - Simulation Examples.

UNIT 2 MATHEMATICAL MODELS 9Hrs.
Statistical Models - Concepts – Discrete Distribution- Continuous Distribution - Poisson Process- Empirical Distributions - Queuing Models – Characteristics- Notation– Queuing Systems - Markovian Models - Generation of Pseudo Random numbers- Properties of random numbers - Techniques for generating random numbers - Testing random number generators - -Generating Random-Variates- Inverse Transform technique– Acceptance- Rejection technique - Composition & Convolution Method.

UNIT 3 ANALYSIS OF SIMULATION DATA 9Hrs.
Input Modeling - Data collection - Assessing sample independence- -Hypothesizing distribution family with data - Parameter Estimation – Goodness-of-fit tests - Selecting input models in absence of data - Output analysis for a Single system - Terminating Simulations– Steady state simulations.

UNIT 4 VERIFICATION AND VALIDATION 9 Hrs.
Model Building – Verification of Simulation Models - Calibration and Validation of Models - Validation of Model Assumptions – Validating Input – Output Transformations

UNIT 5 SIMULATION OF COMPUTER SYSTEMS 9 Hrs.
Simulation Tools - Model Input - High level computer system simulation - CPU Memory Simulation - Comparison of systems via simulation - Simulation Programming techniques - Development of Simulation models.

MAX. 45 Hours

TEXT BOOKS:

1. Jerry Banks and John Carson, “Discrete Event System Simulation”, Fourth Edition, PHI, 2005.
2. Geoffrey Gordon, “System Simulation”, Second Edition, PHI, 2006..
3. Frank L. Severance, “System Modeling and Simulation”, Wiley, 2001.

REFERENCE BOOKS:

1. Averill M. Law and W. David Kelton, “Simulation Modeling and Analysis, Third Edition, McGraw Hill, 2006.
2. Sheldon M. Ross: Introduction to Probability Models 7th Edition, Academic Press, 2002
3. Donald E. Knuth: The Art of Computer Programming - Volume 2: Semi Numerical Algorithms, 2nd Edition, PEARSON Education, Reading MA, USA 2000.
4. Sheldon M. Ross: Simulation 3rd Edition, Academic Press, 2002.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO12	PSO2
CO1	3	3	2										3	2
CO2	3	2	2										3	2
CO3	3	2	2										2	2
CO4	3	2	2										2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM33 - ROBOTIC SENSORS
[HONORS DEGREE – POOL II]

COURSE OUTCOMES

At the end of this course, the learner can able to
1. Explain the basics of robotics sensors.
2. Identify various inertial sensors, displacement measurement sensors, force and touch sensors in robotic applications
3. Use miscellaneous sensors and recognize the importance of telepresence and related technologies.
4. Apply the controlling methodologies for a robot using vision sensor modules.
5. Analyze various Control Computer configurations, Vision Sensor modules and Software Structure.

UNIT-I INTRODUCTION TO ROBOTIC SENSORS 9

An Introduction to sensors and Transducers, History and definitions, classification of sensors, measurement techniques for various parameters associated with robots, Smart Sensing, AI sensing, Need of sensors in Robotics. Industrial sensors, mobile robot sensor types and working. Sensors in mobile and fixed robot configurations, Sensor calibration and validation of sensory data.

UNIT-II POSITION, RANGE AND FORCE MEASUREMENT 10

Position sensors – Optical, non-Optical , Contact, non-contact type sensors position sensing , Range Sensing, types and classification based on the Distance measurement technique, Touch and Slip sensors application in grippers as a feedback device End effector feedback sensors, Sensors types of touch and slip sensors , Tactile sensors, Force sensors and their application in fixed robots , Torque Sensors and associated circuitry used for torque sensors Velocity sensors, Accelerometers types ,LIDAR, SONAR, RADAR sensors for localization of robots.

UNIT-III MISCELLANEOUS SENSORS IN ROBOTICS 9

Different sensing variables , Smell and smart e-nose sensors , Heat or Temperature Humidity classification of RTD and Thermocouples Non-contact based temperature measurement Pyrometry and Active, passive type of IR devices, Light sensors and application of light sensors in robotic interlocks, Speech or Voice recognition Systems, Speaker dependent voice recognition systems Speaker independent voice recognition system, Discrete speech recognition Continuous speech recognition ,Natural language processing system – an overview Case study on voice recognition system (eg.siri, Google talk).

UNIT-IV VISION SENSING 9

Introduction to vision sensor, working and principles of vision sensing, classification of vision sensors, Considerations for camera , and camera specifications, Integration of vision sensors to robot controller, Optics of vision sensor, End effector camera Sensor, Calibration of vision sensors, Robot Control through Vision sensors Robot vision locating position, Robot guidance with vision system, Vision Sensor modules, Vision Software Structure, Vision Sensor software, Advances in vision system for robot control.

UNIT-V MULTI SENSOR CONTROLLED ROBOT ASSEMBLY 8

Material Handling using robot Grippers, Multi sensor-based robot assembly, Classification of grippers and gripping methods based on operation, Gripping methods, accuracy, Robot centered compliance for fixed robot, Compliance system for grippers, gripper sensors for high accurate grasping.

TOTAL: 45 PERIODS

TEXT BOOKS / REFERENCE BOOKS

1. Robot Sensors and Transducers S Ruocco · open university press 2013

2. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, “Robotics – Control Sensing, Vision and Intelligence”, Tata McGraw-Hill Education, 2008.

3. Rafael.C. Gonzalez and Richard E.Woods, “Digital Image Processing”, Addison Wesley, New York, 2009.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	2									2	3
CO2	3	3	2									2	
CO3	3	2	1									3	2
CO4	3	2	2									1	2
CO5	3	3	2									2	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM34 - ARTIFICIAL INTELLIGENCE SEARCH METHODS [HONORS DEGREE – POOL III]

COURSE OUTCOMES

On completion of the course the student will be able to

1. Identify the search algorithm for the AI problems.
2. Describe the problem using first order logic.
3. Apply Informed search strategies for problem solving.
4. Apply the bayes rule to solve the problem for societal concern and issues.

UNIT 1 BASIC SCIENCE BEHIND AI 9 Hrs.

Intelligence – Memory – Computation – Learning – AI's Foundation and History – Intelligent Agents: Features –Behaviour in the environment – Rationality – Nature and its Structure – Case Study: AI Programming Languages History: LISP – Prolog – Python.

UNIT 2 SEARCHING TOWARDS SOLUTION 9 Hrs.

Searching Strategies: Informed Search: BFS – DFS – Depth Bounded DFS – Uninformed Search: Heuristic Functions – Hill Climbing Search – Best First Search – Local Maxima – Solution Space Search – Adversarial Search – Constraint Satisfaction Problem – Case Study: N-Queens Problem

UNIT 3 KNOWLEDGE: ROLE AND REPRESENTATION 9 Hrs.

Knowledge – Definition and Management – Types: Declarative and Procedural Knowledge – Knowledge Engineering behind Logical Agents: Propositional Logic – First Order Logic – Inference: Forward and Backward Chaining – Ontological Engineering – Case Study: Ontology based knowledge representation

UNIT 4 APPROACHES BEHIND PLANNING AND REASONING 9 Hrs.

Algorithm for Planning as State Space Search – Analysis of Planning Approach – Reasoning: Bayes Rule – Bayesian Network and its approximation – Hidden Markov Model – Kalman Filters – Decision Networks – Case Study: Wumpus World Problem

UNIT 5 DECODING AND LEARNING INTELLIGENCE 9 Hrs.

Learning Algorithms: Classification and Regression with Linear Model – Non-Parametric Models – Ensemble Learning – Explanation Based Learning – Learning with Hidden Variables – AI Real Time Applications – Case Study: Nature Inspired Computation

Max.45Hrs.

TEXT/REFERENCE BOOKS

1. Stuart J. Russel, Peter Norvig, "Artificial Intelligence a Modern Approach", 3rd Edition, Pearson Education,2009.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.

3.M. Tim Jones, “Artificial Intelligence: A Systems Approach (Computer Science)”, Jones and Bartlett Publishers, Inc., 1st
Edition, 2008.
4.David L. Poole and Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, 2nd Edition,2010.
5.Ertel, Wolfgang, Introduction to Artificial Intelligence,1st Edition ,2017

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO10	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-		-	3	2
CO2	3	2	2	-	-	-	-	-	-	-		-	3	2
CO3	3	3	3	-	-	-	-	-	-	-		-	3	2
CO4	3	2	2	-	-	-	-	-	-	-		-	3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM35 - GREEN COMPUTING

[HONORS DEGREE – POOL III]

COURSE OUTCOMES:

On Completion of course the student will be able to

1. Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
2. Use the skill in energy saving practices in their use of hardware.
3. Apply tools that can reduce paper waste and carbon footprint by the stakeholders.
4. Apply green computing concepts in real time applications

UNIT 1 GREEN COMPUTING FUNDAMENTALS 9 Hrs.

Information Technology and Environment - Green Enterprise Characteristics- Green Vision-Green Value-Green IT Opportunity- Environmental Intelligence--Envisioning the Green Future.

UNIT 2 GREEN IT STRATEGIES AND ASSETS 9 Hrs.

Introducing Green IT Strategies-Green IT Drivers - Green IT Business Dimensions -Green IT Metrics and Measurements- Green IT Readiness and CMM-Green Assets–Buildings-Green IT Hardware- Green Data Centers- Networking and Communication Infrastructure-Managing Devices for Central Green Services.

UNIT 3 SOCIO CULTURAL ASPECTS OF GREEN IT 9 Hrs.

Green IT"s Social Impact-Green Social stakeholders-Role based view of Green IT-Green User practices- Green IT Ethics and Code Conduct- Privacy and security of green Information - Green IT project - Green Virtual Communities.

UNIT 4 EMERGENT CARBON ISSUES 9 Hrs.

Future Carbon Landscape - Green ICT and Technology Trends - Nanotechnologies- Quantum Computing–Eco-design– New Renewable Energies-Green ICT- Business and Economic Trends.

UNIT 5 CASE STUDIES 9 Hrs.

Applying Green IT Strategies and Application to a Hospital -Packing Industry and Industrial Sector.

Max. 45 Hours

TEXT / REFERENCE BOOKS:

1. Bhuvan Unhelkar, ―Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2014.

2. Woody Leonhard, Katherine Murray, ―Green Home computing for dummies, August 2012.
3. Alin Gales, Michael Schaefer, Mike Ebbers, ―Green Data Center: steps for the Journey, Shroff/IBM rebook, 2011.
4. John Lamb, ―The Greening of IT, Pearson Education, 2009.
5. Jason Harris, ―Green Computing and Green IT- Best Practices on regulations & industry, Lulu.com, 2008
6. Carl speshocky, ―Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
7. Wu Chun Feng (editor), ―Green computing: Large Scale energy efficiency, CRC Press.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PSO1	PSO2
CO1	3	3	1	-	-	-	-	-	-	-	-	3	**2**
CO2	3	2	2	-	-	-	-	-	-	-	-	3	**2**
CO3	3	2	2	-	-	-	-	-	-	-	-	2	**1**
CO4	3	2	2	-	-	-	-	-	-	-	-	2	**1**

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM36 - BRAIN COMPUTER INTERACTION
[HONORS DEGREE – POOL III]

COURSE OUTCOMES

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

1. Comprehend and appreciate the significance and role of this course in the present contemporary world.
2. Evaluate the concept of BCI.
3. Integrate the appropriate feature extraction methods
4. Organize the machine learning algorithms for brain signal processing.
5. Devising the applications of BCI.

UNIT I INTRODUCTION TO BCI 9

Introduction - Brain structure and function, Brain Computer Interface Types - Synchronous and Asynchronous -Invasive BCI -Partially Invasive BCI - Non Invasive BCI, Structure of BCI System, BCI Monitoring Hardware, EEG, ECoG, MEG, fMRI.

UNIT II BRAIN ACTIVATION 9

Brain activation patterns - Spikes, Oscillatory potential and ERD, Slow cortical potentials, Movement related potentials-Mu rhythms, motor imagery, Stimulus related potentials - Visual Evoked Potentials – P300 and Auditory Evoked Potentials, Potentials related to cognitive tasks.

UNIT III FEATURE EXTRACTION METHODS 9

Data Processing – Spike sorting, Frequency domain analysis, Wavelet analysis, Time domain analysis, Spatial filtering -Principal Component Analysis (PCA), Independent Component Analysis (ICA), Artefacts reduction, Feature Extraction - Phase synchronization and coherence.

UNIT IV MACHINE LEARNING METHODS FOR BCI 9

Classification techniques –Binary classification, Ensemble classification, Multiclass Classification, Evaluation of classification performance, Regression - Linear, Polynomial, RBF's, Perceptron's, Multilayer neural networks, Support vector machine, Graph theoretical functional connectivity analysis

UNIT V APPLICATIONS OF BCI 9

Case Studies - Invasive BCIs: decoding and tracking arm (hand) position, controlling prosthetic devices such as orthotic hands, Cursor and robotic control using multi electrode array implant, Cortical control of muscles via functional electrical stimulation. Noninvasive BCIs:P300 Mind Speller, Visual cognitive BCI, Emotion detection. Ethics of Brain Computer Interfacing.

TOTAL : 45 PERIODS

TEXTBOOKS

1. Rajesh.P.N.Rao, “Brain-Computer Interfacing: An Introduction”, Cambridge University Press, First edition, 2013.
2. Jonathan Wolpaw, Elizabeth Winter Wolpaw, “Brain Computer Interfaces: Principles and Practice”, Oxford University Press, USA, Edition 1, January 2012.

REFERENCES:

1. Ella Hassianien, A &Azar.A.T (Editors), “Brain-Computer Interfaces Current Trends and Applications”, Springer, 2015.
2. Bernhard Graimann, Brendan Allison, GertPfurtscheller, "Brain-Computer Interfaces: Revolutionizing Human-Computer Interaction", Springer, 2010
3. Ali Bashashati, MehrdadFatourechi, Rabab K Ward, Gary E Birch,” A survey of signal Processing algorithms in brain–computer interfaces based on electrical brain signals” Journal of Neural Engineering, Vol.4, 2007, PP.32-57
4. Arnon Kohen, “Biomedical Signal Processing”, Vol I and II, CRC Press Inc, Boca Rato, Florida.
5. Bishop C.M., “Neural networks for Pattern Recognition”, Oxford, Clarendon Press, 1995.
6. Andrew Webb, “Statistical Pattern Recognition”, Wiley International, Second Edition, 2002.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO5	3	2	1	-	-	-	-	-	-	-	--	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM37 - MOBILE ROBOTICS
[HONORS DEGREE – POOL III]

COURSE OUTCOMES

At the end of this course, the learner can able to

1. Explain the design and kinematic modeling of mobile robots and wheels
2. Identify control algorithms involved in mobile robots
3. Apply various sensors used for mobile robot perception
4. Analyze the localization and mapping of environment

UNIT-I INTRODUCTION TO MOBILE ROBOTS 9

Introduction to Mobile robots, Locomotion, Classification -Legged, hopping, Wheeled, Aerial, Key issues in locomotion, Degree of mobility and steerability, robot maneuverability, kinematic modeling of Mobile robot, Wheel kinematic constraints Motion control, Kinematic models of simple car and legged robots.

UNIT-II CONTROL OF MOBILE ROBOTS 10

Control theory, Control design basics, Cruise-Controllers, Performance Objectives, State space modelling of mobile robots, Linearization, LTI system, Stability, PID control, basic control algorithms, Low-level, control. State space control, backstepping control.

UNIT-III PERCEPTION AND ACTUATION 9

Sensors for mobile robots, Classification, performance, uncertainty in sensors, Wheel sensor, Heading sensor, Accelerometer, Inertial measurement, Motion sensor, range sensors, Global positioning system (GPS), Doppler effect-based sensors, Vision sensor , Basics of computer vision, Image processing techniques, Feature extraction – image, Range data location recognition, Actuator systems: Types of motors , DC , AC servo systems, Linear actuation systems.

UNIT-IV LOCALIZATION 9

Major challenges, localization-based navigation, Belief representation, Map representation, Probabilistic Map, Examples of localization systems, Autonomous map building, Odometric position estimation, Markov localization, Bayesian localization, Kalman localization, Positioning beacon systems

UNIT-V PLANNING AND NAVIGATION 8

Planning and Reaction, Path Planning, Graph search, , D* algorithm, Potential field. Obstacle avoidance, Path planning algorithms based on A* AO*, Dijkstra, Voronoi diagrams, probabilistic Road Maps (PRM), Rapidly-exploring random tree (RRT), Bug algorithm, Bug-01 and Bug-02, Histogram, Curvature velocity techniques, Navigation architecture, Trajectory planning Case studies on path planning and navigation of mobile robots on various terrains.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Siegwart, Nourbakhsh, "Introduction to Autonomous Mobile Robots", MIT Press, 2011.
2. Thrun, Burgard, Fox, "Probabilistic Robotics", MIT Press, 2005.
3. S. M. LaValle, "Planning Algorithms", Cambridge University Press, 2006.
4. Howie M. Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram
5. Burgard, Lydia Kavraki, Sebastian Thrun, Ronald C Arkin · 2005 "Principles of Robot Motion: Theory, Algorithm & Implementations", MIT Press, 2005.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO10	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	3
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM38 - INDUSTRIAL IOT
[HONORS DEGREE – POOL IV]

COURSE OUTCOMES

At the end of the course learners will be able to

1. Explain the state of the art in Internet of Things architecture
2. Use different protocols in IoT
3. Apply the integration of IoT and Cloud.
4. Analyze next generation cloud technology for IOT application

UNIT I IOT AN OVERVIEW 9

IOT Architecture and Its Characteristics-Challenges and Issues-Internet of Things Paradigm-Sensors and Actuators-Types of Sensors -The Integration Technologies and Tools for IoT Environments.

UNIT II COMMUNICATION PROTOCOLS 9

Basics Of Networking: Communication Technologies-IOT Data Link Layer & Network Layer Protocols-Transport & Session Layer Protocols-Service Layer Protocols -Security-Data Handling and Analytics.

UNIT III PROGRAMMING WITH ARDUINO AND RASBERRY PI 9

Various IOT Development Boards-Serial Communication Protocols-Devices and Gateways - Arduino Programming: Integration of Sensors and Actuators with Arduino- Arduino Microprocessor Usage -Implementation of IOT with Raspberry pi.

UNIT IV UDOO Neo PROGRAMMING 9

Implementation with UDOO Neo IOT Gateway-Linux Fundamentals and commands, installing Python on UDOO Neo- Programming GPIO Pins-connecting UDOO Neo to internet-The Enablement Platforms for IOT Applications and Analytics.

UNIT V NEXT GENERATION CLOUDS FOR IOT APPLICATIONS 9

Cloud Computing-Sensor-Cloud-Fog Computing-Applications: Air Pollution Meter- Home Automation-Baggage Tracker-Sign to speech using the Internet of Things-Weather Monitoring System-Automated Street Lighting System. Case Study: Agriculture-Healthcare-Activity Monitoring.

TOTAL: 45 PERIODS

TEXT BOOK/ REFERENCES

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases”Pethuru Raj Anupama C. Raman “2017 by Taylor & Francis Group, LLC
2. onbo Zhou,“The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.
3. Arshdeep Bahga, Vijay Madisetti, “Internet of Things :A hands on approach”, First Edition, Universities Press, 2015.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	2	2									2	2
CO2	3	2	1									2	2
CO3	3	3	2									2	3
CO4	3	1	1									3	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM39 - DATABASE AND CLOUD DATA CONTROL
[HONORS DEGREE – POOL IV]

COURSE OUTCOMES

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

1. Explain and classical models for Data security
2. Identify the problems and choose the relevant models and algorithms to apply.
3. Assess the strengths and weaknesses of various access control models and to analyze their behavior.
4. Apply role-based access control terms and concepts
5. Analyze the Key management of Cloud data security mechanisms

UNIT I - INTRODUCTION TO ACCESS CONTROL 9

Introduction to Access Control, Purpose and fundamentals of access control – Database security- Policies of Access Control, Models of Access Control, and Mechanisms

UNIT II ACCESS CONTROL POLICIES AND MECHANISMS 09

Discretionary Access Control (DAC), Non- Discretionary Access Control, Mandatory Access Control (MAC). Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations.

UNIT III – ROLE BASED ACCESS CONTROL 9

Role-Based Access Control (RBAC) and Limitations, Core RBAC, Hierarchical RBAC, Statically Constrained RBAC, Dynamically Constrained RBAC, Limitations of RBAC.Comparing RBAC to DAC and MAC Access Control policy, Integrating RBAC with enterprise IT infrastructures: RBAC for WFMSs, RBAC for UNIX and JAVA environments.

UNIT IV - SMART CARD BASED INFORMATION SECURITY 09

Smart Card based Information Security, Smart card operating system-fundamentals, design and implantation principles, memory organization, smart card files, file management. PPS Security techniques- user identification, smart card security, quality assurance and testing, smart card life cycle-5 phases, smart card terminals.

UNIT V - CLOUD DATA SECURITY 09

Recent trends in Database security and access control mechanisms. Cloud Data Audit: Intro, Audit, Best Practice, Key management, Cloud Key Management Audit.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Role Based Access Control: David F. Ferraiolo, D. Richard Kuhn, Ramaswamy Chandramouli.

ONLINE RESOURCES

1. http://www.smartcard.co.uk/tutorials/sct-itsc.pdf : Smart Card Tutorial.
2. Advanced System Security Topics, https://www.coursera.org/lecture/advancedsystem-security-topics/role-based-access-control-rbac-bYvzS.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
CO1	3	3	1									3	
CO2	3	2	1									3	2
CO3	3	3	2									2	3
CO4	3	3	2									2	
CO5	3	2	1									2	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM40 - MOBILE USER INTERFACE DEVELOPMENT
[HONORS DEGREE – POOL IV]

COURSE OUTCOMES

1. Analyze the terminologies related to the mobile user interface
2. Apply the concept learned in mobile UI development.
3. Analyze the mobile application requirement.
4. Estimate suitable UI controls for the requirement.

UNIT I INTRODUCTION TO MOBILE COMPUTING PLATFORM 9

History of Mobile Computing Platform - Mobile Software Stack - Mobile SDK - Mobile Emulator - Mobile UI Concepts - Mobile Service Components - Media and Telephony Components - Fundamental Components: View - Activity - Intent - Content Provider - Service - Mobile Application Lifecycle

UNIT II MOBILE APPLICATION FRAMEWORK 9

Resources, Content Providers and Intents: String Resources - Layout Resources - Resource IDs - Raw Resources - Assets - Directory Structure - Built-in Providers - Architecture of Content Providers Implementing Content Providers - Available Intents in Android - Intents and Data URIs - Generic Actions - Directly Invoke an Activity - Understanding Intent Categories - The Rules for Resolving Intents to Their Components

UNIT III MOBILE UI CONTROLS 9

Building User Interfaces and Using Controls: UI Development in Mobile - Common Controls : Text Controls - Button Controls - List Controls - Grid Controls - Date and Time Controls - MapView Control - Gallery Control - Layout Managers : Linear Layout Layout Manager - Absolute Layout Layout Manager - Understanding Adapters: Array Adapter - Simple Cursor Adapter - UX Design.

UNIT IV 2D GRAPHICS 9

Menu: Creating a Menu - Responding to Menu Items - Context Menus - Dialogs: Alert Dialog - Prompt Dialog - 2D Animation - View Animation: Transformation Matrices - Adding Animation - Animation Listener - Layout Animation: Tweening Animation Types - Animating the ListView - Using Interpolators - Frame-by-Frame Animation.

UNIT V 3D GRAPHICS AND THREADS 9

3D Graphics: Understanding OpenGL - OpenGL ES - Essential Drawing with OpenGL ES - Understanding the Camera and Coordinates - Creating and Using the OpenGL Test Harness - Simple Triangle Renderer - Threads: Asynchronous Tasks - Manual Thread Creation - Thread Synchronization - Scheduling Background Jobs - Job Scheduler - Working with Notification Channels - Adding Notification Actions.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Horton, J., 2015. Android Programming for Beginners: Learn all the Java and Android skills you need to start making powerful mobile applications. Packt Publishing Limited, Birmingham.
2. Mednieks, Z., Meike, G.B., Dornin, L., Nakamura, M., 2012. Programming Android: Java Programming for the New Generation of Mobile Devices, 2nd edition. ed. O'Reilly Media.
3. Darwin, I.F., 2017. Android Cookbook: Problems and Solutions for Android Developers, 2nd edition. ed. O'Reilly Media.
4. Cohen, R., Wang, T., 2014. GUI Design for Android Apps, 1st ed. edition. ed. Apress, Berkeley, California.
5. Boyer, R., 2018. Android 9 Development Cookbook: Over 100 recipes and solutions to solve the most common problems faced by Android developers, 3rd Edition, 3rd edition. ed. Packt Publishing Limited.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
III B. TECH II SEMESTER (CSE (AI&ML))

L	T	P	C
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20ACM41 - VIRTUALIZATION AND CONTAINERIZATION
[HONORS DEGREE – POOL IV]

COURSE OUTCOMES

At the end of this course, the learner can able to

1. Describe the fundamentals of cloud computing. Knowledge
2. Use virtual machine using VirtualBox.
3. Create a container that runs a web server, database server.
4. Apply DevOps infrastructure

UNIT-I CLOUD COMPUTING FUNDAMENTALS 9

Introduction to Cloud Computing - Definition of Cloud - Evolution of Cloud Computing - Computing Platforms and Technologies - Principles of Parallel and distributed computing - Elements of Parallel Computing - Technologies for distributed computing.

UNIT-II VIRTUALIZATION 9

Characteristics of Virtualized Environments - Virtualization and Cloud computing - Pros and Cons of Virtualization - Technology Examples - Cloud computing architecture - Cloud Reference Model, Types of cloud, and Challenges.

UNIT-III CONTAINER ECOSYSTEM 9

Docker Client, Host - Docker Engine, Image, Container, Registry - Docker file and hub - Basic Commands to manage containers.

UNIT-IV CONTAINER DATASTORE 9

Serialization - Docker data volumes - Docker-compose - Containerizing and application - Docker Swarm - Docker networking.

UNIT-V DevOps INFRASTRUCTURE 9

Container Echo system - Infrastructure as service - Managed Kubernetes Services - Working with Kubernetes Objects - Managing Cloud resources - Operating Clusters - Running Container.

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TOTAL: 45 PERIODS

TEXTBOOK/REFERENCES

1. Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. Mastering Cloud Computing. Tata McGraw-Hill Education, 2013.
2. Rittinghouse, John W., and James F. Ransome. Cloud Computing: Implementation, Management, and Security. CRC Press, 2017.
3. Poulton, Nigel. Docker Deep Dive. JJNP Consulting Limited, 2019.
4. Arundel, John, and Justin Domingus. Cloud-Native DevOps with Kubernetes: Building, Deploying, and Scaling Modern Applications in the Cloud. O'Reilly Media, Inc., 2019.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	1
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	1

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
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20ACM42 - STREAM PROCESSING AND ANALYTICS
[HONORS DEGREE – POOL V]

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Explain the need for stream processing
2. Comprehend the architectures of stream processing.
3. Use Distributed Processing and Resilience Model.
4. Apply effective streaming solutions using Structured Streaming.
5. Analyze streaming solutions using Spark Streaming.

UNIT 1 INTRODUCTION 9

Fundamentals of Stream Processing: Stream Processing - Examples of Stream Processing-Scaling Up Data Processing-Distributed Stream Processing-Introducing Apache Spark. Stream-Processing Model: Sources and Sinks- Immutable Streams Defined from One Another Transformations and Aggregations- Window Aggregations - Stateless and Stateful Processing- The Effect of Time.

UNIT 2 STREAMING ARCHITECTURES 9

Components of a Data Platform- Architectural Models- The Use of a Batch-Processing Component in a Streaming Application- Referential Streaming Architectures- Streaming Versus Batch Algorithms. Apache Spark as a Stream-Processing Engine: Spark's Memory Usage- Understanding Latency Throughput-Oriented Processing- Fast Implementation of Data Analysis.

UNIT 3 DISTRIBUTED PROCESSING 9

Spark's Distributed Processing Model: Running Apache Spark with a Cluster Manager-Spark's Own Cluster Manager - Resilience and Fault Tolerance in a Distributed System- Data Delivery Semantics Micro batching and One-Element-at-a-Time - Bringing Micro batch and One-Record-at a- Time Closer Together- Dynamic Batch Interval- Structured Streaming Processing Model. Spark's Resilience Model: Resilient Distributed Datasets in Spark - Spark Components - Spark's Fault-Tolerance Guarantees.

UNIT 4 STRUCTURED STREAMING 9

Introducing Structured Streaming- The Structured Streaming Programming Model – Structured Streaming in Action – Structured Streaming Sources – Structured Streaming Sinks - Event Time– Based Stream Processing.

UNIT 5 SPARK STREAMING 9

Introducing Spark Streaming - The Spark Streaming Programming Model - The Spark Streaming Execution Model - Spark Streaming Sources - Spark Streaming Sinks - Time-Based Stream Processing- Working with Spark SQL – Checkpointing - Monitoring Spark Streaming- Performance Tuning.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Gerard Maas and François Garillot , “Stream Processing with Apache Spark: Mastering Structured Streaming and Spark Streaming”, O’Reilly, 2019.

REFERENCE BOOKS

1.Henrique C. M. Andrade, BuğraGedik and Deepak S. Turaga, “Fundamentals of Stream Processing: Application Design, Systems, and Analytics”, Cambridge University Press, 2014.
2. Bryon Ellis, “Real-Time Analytics: Techniques to Analyze and Visualize Streaming Data”, Wiley, 1st edition, 2014.
3. AninditaBasak, Krishna Venkataraman, Ryan Murphy, Manpreet Singh, “Stream Analytics with Microsoft Azure”, Packt Publishing, December 2017.

E BOOKS/SUPPORTING RESOURCES

1. https://github.com/stream-processing-with-spark
1. https://www.edx.org/course/processing-real-time-data-streams-in-azure
2. https://www.coursera.org/learn/big-data-integration-processing

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	2
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM43 - SELF DRIVING CAR
[HONORS DEGREE – POOL V]

COURSE OUTCOMES

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

1. Describe the terminologies related to self-driving cars.
2. Use the concept related to perception and estimation.
3. Apply mobile programming requirement.
4. Analyze architecture for self-driving cars.

UNIT I - SELF DRIVING CAR FUNDAMENTALS **9**

Introduction - Architecture of Autonomous Driving Stacks - Hardware Platforms - Electronic Control Unit (ECU) - Real-Time Operating System - Data Distributed Services (DDS) - Autonomous Driving Safety Standards - Fundamentals of Robot Operating System.

UNIT II PERCEPTION **9**

Object detection in the autonomous driving stack - Preprocessing LiDAR data - lidar- based object detection stack - Ground filtering - Clustering/object detection - Shape Extraction - Camera basics - Camera calibration - Object detection using YOLO - Lane detection - Radar basics - Measurement of object parameters: distance, dimension, velocity - Object filtering - CAN Interface.

UNIT III - LOCALIZATION **9**

Localization for self-driving cars - Odometry state estimator - Kalman filters - Extended Kalman Filter - Unscented Kalman Filter - Normal Distribution Transform (NDT) algorithm - NDT algorithm in 2D - NDT algorithm in 3D - NDT class implementation.

UNIT IV - MOTION PLANNING AND CONTROL **9**

Hierarchical architecture in autonomous driving - Decision making in autonomous driving - Motion planning in autonomous driving - Space configuration -Pathfinding algorithms - Attractive and repulsive forces - Model Predictive Control - Feedback control - Optimal control - Relationship between LQR, LQG and MPC.

UNIT V - DATA STORAGE AND MAPS **9**

Data Storage architecture - HD Maps for autonomous driving - Industry standards for HD Maps - Creating HD Maps - HD Maps in Autoware - HD Map architecture and provision within AD Software stack - HD map usages.

TOTAL: 45 PERIODS

TEXT BOOK/REFERENCE:

1. Collaborative Perception, Localization and Mapping for Autonomous Systems | Yufeng Yue | Springer.” https://www.springer.com/gp/book/9789811588594 (accessed Mar. 22, 2021).
2. Radar Signal Processing for Autonomous Driving | Jonah Gamba | Springer. https://www.springer.com/gp/book/9789811391927 (accessed Mar. 22, 2021).
3. H. Sjafrie, Introduction to Self-Driving Vehicle Technology, 1st edition. Chapman and Hall/CRC, 2019.

CO-PO Mapping:

	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

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM44 - MACHINE LEARNING FOR BIOINFORMATICS
[HONORS DEGREE – POOL V]

COURSE OUTCOMES

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

1. Explain different types of biological data observed from varieties of modalities.
2. Use probabilistic model-based learning to different types of bioinformatics data
3. Apply different types of machine learning algorithms with gene expression data.
4. Analyze Hidden Markov Model (HMM) methods to bioinformatics data

UNIT I INTRODUCTION 9

The Biology of a Living Organism - Cells - DNA and Genes - Proteins - Metabolism - Biological Regulation Systems: When They Go Awry - Measurement Technologies - Biological Data in Digital Symbol Sequences - Genomes : Diversity, Size, and Structure - Proteins and Proteomes - On the Information Content of Biological Sequences - Prediction of Molecular Function and Structure

UNIT II PROBABILISTIC AND MODEL-BASED LEARNING 9

Introduction: Probabilistic Learning - Basics of Probability - Random Variables and Probability Distributions - Basics of Information Theory - Basics of Stochastic Processes - Hidden Markov Models - Frequentist Statistical Inference - Some Computational Issues - Bayesian Inference

UNIT III MACHINE LEARNING ALGORITHMS 9

Introduction - Dynamic Programming - Gradient Descent - EM/GEM Algorithms - Markov-Chain Monte-Carlo Methods - Simulated Annealing - Evolutionary and Genetic Algorithms - Learning Algorithms: Miscellaneous Aspects

UNIT IV HIDDEN MARKOV MODELS 9

Introduction - Prior Information and Initialization - Likelihood and Basic Algorithms - Learning Algorithms - Applications of HMMs: General Aspects - Hidden Markov Models: Applications - Protein Applications - DNA and RNA Applications - Advantages and Limitations of HMMs

UNIT V PYTHON FOR BIOINFORMATICS 9

Tetranucleotide Frequency: Counting Things - Creating the Program Using new.py - Using argparse - Tools for Finding Errors in the Code - Introducing Named Tuples - Adding Types to Named Tuples - Representing the Arguments with a NamedTuple - Reading Input from the Command Line or a File - Iterating and Counting the Characters in a String - Counting the Nucleotides - Writing and Verifying a Solution - Additional Solutions - Solution - Creating a count() Function and Adding a Unit Test - Using str.count() - Using a Dictionary to Count All the Characters

Total Hours: 45

TEXT BOOKS

1.Baldi, P., & Brunak, S. (2001). Bioinformatics: the machine learning approach. MIT press.
2.Mitra, S., Datta, S., Perkins, T., & Michailidis, G. (2008). Introduction to machine learning and bioinformatics. CRC Press.
3.Ken Youens-Clark. (2021). Mastering Python for Bioinformatics. O'Reilly Media, Inc.,

REFERENCES

1. R. Durbin, S. Eddy, A. Krogh, and G. Mitchison (1998), Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press
2. Edward Keedwell and Ajit Narayanan (2005), Intelligent Bioinformatics: The Application of Artificial Intelligence Techniques to Bioinformatics Problems, Wiley
3. P Baldiand S Brunak, Bioinformatics: The Machine Learning Approach
4. Youens-Clark, K. (2021). Mastering Python for Bioinformatics: How to Write Flexible, Documented, Tested Python Code for Research Computing. United Kingdom: O'Reilly Media, Incorporated.
5. Bassi, S. (2017). Python for Bioinformatics (2nd ed.). Chapman and Hall/CRC.
6. Olson et al., 2018. Data-driven advice for applying machine learning to bioinformatics problems
7. Husmeier D, Dybowski R, and Roberts S (2005), Probabilistic Modeling in Bioinformatics and Medical Informatics, Springer
8. Nat Cell Biol. 2001 Aug;3(8):E190-5. Review. PubMed PMID: 11483980
9. Kim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE, Seidman JG.Polony multiplex analysis of gene expression (PMAGE) in mouse hypertrophic cardiomyopathy.Science. 2007 Jun 8;316(5830):1481-4. PubMed PMID: 17556586
10. MacBeath G, Schreiber SL. Printing proteins as microarrays for high-throughput function determination. Science. 2000 Sep 8;289(5485):1760-3. PubMed PMID: 10976071.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3	2
CO2	3	2	2										3	2
CO3	3	2	2										2	1
CO4	2	2	2										2	2

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
[AUTONOMOUS]
IV B. TECH I SEMESTER (CSE (AI&ML))

L	T	P	C
3	1	0	4

20ACM45 - MOBILE VR AND AI IN UNITY
[HONORS DEGREE – POOL V]

COURSE OUTCOMES

At the end of this course, the learner can able to
1. Explain the fundamentals of C# coding.
2. Use AI algorithms (A*, IL, and RL) for game development.
3. Apply Machine learning algorithms for Virtual reality.
4. Apply Reinforcement learning for game development.

UNIT-I INTRODUCTION 9

Introduction to Unity, Unity Editor, Moving a Cube, Lights, Particle Systems, Applying Physics, and Unity Asset Store, C# Coding Introduction, Variables, Methods, If Blocks, Loops, Hello Mammoth, User Interaction in Unity, Inputs Introduction Preview, Key Presses, Moving a Player, Jumping, Moving Forward, Cycling Cameras, Prefabs Introduction, Prefabs, Instantiating Objects, Random Angles, Destroying Objects, Explosion Effects, Adding Explosion Effects.

UNIT-II DEVELOPING A PATHFINDING GAME 9

Developing a Pathfinding Game, How to Set Up a Project, Node, String Map, A* Algorithm Setup, A* Algorithm Loop, Auxiliary Methods, Finishing the Algorithm, Importing 2D Assets, Building a Level, From Console to Visual, Adding Tanks, Identifying Nodes, Moving the Tank, Visually Moving Tank, Smooth Movement, Smooth Rotation, Ordering Tank to Move, Speeding up Player, Spawning Logic, Crate Visuals, Adding Crates to Valid Positions, Collecting Crates, Score Counting, Game Interface, Starting the Game, Game Over Screen, Scoring, Sounds.

UNIT-III VIRTUAL REALITY 9

VR Introduction - Unity, Activating VR, Building a Castle, Camera Changing Position, Lowering Castle Doors, Triggering Events Interface, Blender, Download and Install Blender, Introduction & Customizing Settings, Controlling Blender Camera, Emulate Numpad Camera, Manipulating Objects, Common Tools, Mirroring 1 Side of Object. Case Study: Flappy bird Unity game, First person shooter game, Kart Unity game

UNIT-IV UNITY-ML 9

Introduction to Unity-ML, Machine Learning, different kinds of learnings, Neural Networks (NNs), Training a NN, Optimizer, Convolutional layers, Transfer learning, Imitation learning in Unity, Training the kart in kart game via IL, Testing the drive.

UNIT-V REINFORCEMENT LEARNING IN UNITY 9

Introduction to Reinforcement Learning in Unity-ML, Reinforcement Learning, Initial state, training a policy, The PPO algorithm, Evolutional Strategies, Reward, training a kart in the kart game with RL, Tensor board analysis, Testing results.

Total Hours: 45

TEXT BOOKS

1. Linowes, J., & Schoen, M. (2016). Cardboard VR Projects for Android. Packt Publishing Ltd.
2. Lanham, M. (2019). Hands-On Deep Learning for Games: Leverage the power of neural networks and reinforcement learning to build intelligent games. Packt Publishing Ltd.

REFERENCES

1. Aversa, D., Kyaw, A. S., & Peters, C. (2018). Unity Artificial Intelligence Programming: Add powerful, believable, and fun AI entities in your game with the power of Unity 2018 Packt Publishing Ltd.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2
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CO3	3	3	3	-	-	-	-	-	-	-	-	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	3	3

3-High Mapping **2-Medium Mapping** **1-Low Mapping**