



**SREENIVASA INSTITUTE OF
TECHNOLOGY AND MANAGEMENT
STUDIES
(AUTONOMOUS)**

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

**B.TECH
Course Structures and Syllabi
Under R23 Regulations**

(Applicable for 2023-2024 Regular Students & 2024-2025 Lateral Students)

**Department of Computer Science & Engineering
(Artificial Intelligence & Machine Learning)**



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Artificial Intelligence & Machine Learning)**

B.Tech R23 - COURSE STRUCTURE AND SYLLABI

Semester I (First Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23BSC111T	Applied Chemistry	2	1	0	3	30	70	100
2	23BSC113T	Engineering Physics	2	1	0	3	30	70	100
3	23BSC114T	Linear Algebra and Calculus	2	1	0	3	30	70	100
4	23ESC114T	Introduction to Programming	2	1	0	3	30	70	100
5	23ESC111T	Basic Civil and Mechanical Engineering	2	1	0	3	30	70	100
6	23BSC115L	Applied Chemistry Lab	0	0	2	1	30	70	100
7	23BSC117L	Engineering Physics Lab	0	0	2	1	30	70	100
8	23ESC115L	Computer Programming Lab	0	0	3	1.5	30	70	100
9	23ESC117L	Engineering Workshop	0	0	3	1.5	30	70	100
10	23HSM113L	Health and wellness, Yoga and Sports	0	0	1	0.5	-	-	100
Contact Hours per week			10	5	11	-	-	-	-
Total Hours per week			26			-	-	-	-
Total credits						20.5	-	-	-
Total Marks							270	630	1000

Semester II (First Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23HSM111T	Communicative English	2	0	0	2	30	70	100
2	23BSC121T	Differential Equations and Vector Calculus	2	1	0	3	30	70	100
3	23ESC112T	Basic Electrical and Electronics Engineering	2	1	0	3	30	70	100
4	23CSE121T	Data Structures	2	1	0	3	30	70	100
5	23ESC113T	Engineering Graphics	1	0	4	3	30	70	100
6	23HSM112L	Communicative English Lab	0	0	2	1	30	70	100
7	23ESC116L	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
8	23CSE122L	Data Structures Lab	0	0	3	1.5	30	70	100
9	23ESC118L	IT Workshop	0	0	2	1	30	70	100
10	23HSM114L	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5	-	-	100
Contact Hours per week			09	3	15	-	-	-	-
Total Hours per week			27			-	-	-	-
Total credits						19.5	-	-	-
Total Marks							270	630	1000

Semester III (Second Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23BSC232T	Discrete Mathematics and Graph Theory	2	1	-	3	30	70	100
2	23HSM234T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	-	3	30	70	100
3	23CAI231T	Artificial Intelligence	2	1	-	3	30	70	100
4	23CSE231T	Advanced Data Structures and Algorithm Analysis	2	1	-	3	30	70	100
5	23CSE232T	Object Oriented Programming Through Java	2	1	-	3	30	70	100
6	23CSE233L	Advanced Data Structures and Algorithm Analysis Lab	-	-	3	1.5	30	70	100
7	23CSE234L	Object Oriented Programming Through Java Lab	-	-	3	1.5	30	70	100
8	23CSE235L	Python Programming (Skill Enhancement Course)	-	1	2	2	30	70	100
9	23MAC231U	Environmental Science	2	-	-	-	30	-	P
Contact Hours per week			12	06	08	-	-	-	-
Total Hours per week			26			-	-	-	-
Total credits						20	-	-	-
Total Marks							270	560	800

Semester IV (Second Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23BSC242T	Optimization Techniques	2	-	-	2	30	70	100
2	23BSC243T	Probability and Statistics	2	1	-	3	30	70	100
3	23ESC232T	Digital Logic and Computer Organization	2	1	-	3	30	70	100
4	23CSE241T	Database Management Systems	2	1	-	3	30	70	100
5	23CSM241T	Machine Learning	2	1	-	3	30	70	100
6	23CSE245L	Database Management Systems Lab	-	-	3	1.5	30	70	100
7	23CSE246L	Full Stack Development –I (Skill Enhancement Course)	-	1	2	2	30	70	100
8	23CSM243L	Machine Learning Lab	-	-	3	1.5	30	70	100
9	23ESC241I	Design Thinking and Innovation	1	-	2	2	30	70	100
Contact Hours per week			11	05	10	-	-	-	-
Total Hours per week			26			-	-	-	-
Total credits						21	-	-	-
Total Marks							270	630	900
Mandatory Community Service Project Internship of 06-08 weeks duration during summer Vacation									

Semester V (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI351T	Cloud Computing for AI	2	1	-	3	30	70	100
2	23CAI352T	Computer Vision & Image Processing	2	1	-	3	30	70	100
3	23CSM351T	Big Data Analytics & AI Applications	2	1	-	3	30	70	100
4	PE-I	Professional Elective – I	3	-	-	3	30	70	100
5	OE-I	Open Elective – I	3	-	-	3	30	70	100
6	23ESC351T	Introduction to Quantum Technologies and Applications	3	-	-	3	30	70	100
7	23CAI356L	Computer Vision and Image Processing Lab	-	-	3	1.5	30	70	100
8	23CSM352L	Big Data & Cloud Computing Lab	-	-	3	1.5	30	70	100
9	23CSE356L	Full Stack Development - II (Skill Enhancement Course)	-	1	2	2	30	70	100
10	23CSM351P	Evaluation of Community Service Project	-	-	-	2	-	100	100
11	23MAC351U	Technical Paper Writing & IPR	2	-	-	-	30	-	P
Contact Hours per week			17	04	08	-	-	-	-
Total Hours per week			29			-	-	-	-
Total credits						25	-	-	-
Total Marks							300	730	1000

Semester VI (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CSM361T	Deep Learning	2	1	-	3	30	70	100
2	23CAI353T	Natural Language Processing	2	1	-	3	30	70	100
3	23CSE353T	Operating Systems & Systems Programming	2	1	-	3	30	70	100
4	PE-II	Professional Elective – II	3	-	-	3	30	70	100
5	PE-III	Professional Elective – III	3	-	-	3	30	70	100
6	OE-II	Open Elective – II	3	-	-	3	30	70	100
7	23CSM365L	Deep Learning Lab	-	-	3	1.5	30	70	100
8	23CSE357L	Operating Systems & Systems Programming Lab	-	-	3	1.5	30	70	100
9	23HSM241L	Soft Skills (Skill Enhancement Course)	-	1	2	2	30	70	100
10	23ESC352L	Tinkering Lab	-	-	2	1	30	70	100
11	23CSM361P	Domain Specific Workshop	-	-	-	-	50	-	-
Contact Hours per week			15	04	10	-	-	-	-
Total Hours per week			29			-	-	-	-
Total credits						24	-	-	-
Total Marks							350	700	1000

Semester VII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI471T	Generative AI and Prompt Engineering	2	1	-	3	30	70	100
2	MSE	Management Science Elective	2	-	-	2	30	70	100
3	PE-IV	Professional Elective – IV	3	-	-	3	30	70	100
4	PE-V	Professional Elective – V	3	-	-	3	30	70	100
5	OE-III	Open Elective – III	3	-	-	3	30	70	100
6	OE-IV	Open Elective – IV	3	-	-	3	30	70	100
7	23CAI474L	Prompt Engineering (Skill Enhancement Course)	-	1	2	2	30	70	100
8	23CSM471P	Evaluation Industry Internship	-	-	-	2	-	100	100
9	23MAC471U	Gender Sensitization	2	-	-	-	30	-	P
Contact Hours per week			18	02	02	-	-	-	-
Total Hours per week			22			-	-	-	-
Total credits						21	-	-	-
Total Marks							240	590	800

Semester VIII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CSM481P	Internship	-	-	24	4	-	100	100
2	23CSM482P	Project Work	-	-	-	8	30	70	100
Contact Hours per week			-	-	24	12	-	-	-
Total Hours per week			24			-	-	-	-
Total credits						12	-	-	-
Total Marks							30	170	200

Note:

1. A student is permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Minor from V Semester onwards.
2. A student shall not be permitted to take courses as Open Electives / Minor / Honours with content substantially equivalent to the courses pursued in the student's primary major.
3. Minor & Honour tracks shall be offered for 18 credits over and above 163 Credits 05 theory courses of 3 credits each, practical courses of 1.5 credits each or project for 3 credits for Minors and Honours.
4. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline.
5. **One Industry Visit** is Mandatory either in 3rd or 4th year
6. Student will undergo **ONE WEEK WORKSHOP** (domain specific) after the end of the FIFTH semester examination and it will be reflected in SIXTH semester for zero credits.
7. **One Expert Lecturer** in every semester (domain Specific) is mandatory.

Professional Elective – I - Semester V (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI355A	Computational Intelligence	3	-	-	3	30	70	100
2	23CSD351A	Data Visualization	3	-	-	3	30	70	100
3	23CSD351B	Exploratory Data Analysis	3	-	-	3	30	70	100
4	23CSE354D	Soft Computing	3	-	-	3	30	70	100

Professional Elective – II - Semester VI (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI363A	Blockchain for AI	3	-	-	3	30	70	100
2	23CAI363B	Graph Neural Networks	3	-	-	3	30	70	100
3	23CSD361T	Predictive Analytics	3	-	-	3	30	70	100
4	23CSM362A	Recommender Systems	3	-	-	3	30	70	100

Professional Elective – III - Semester VI (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI364A	AI for Finance	3	-	-	3	30	70	100
2	23CSD362A	Social Network Analysis	3	-	-	3	30	70	100
3	23CSM363B	Edge Computing	3	-	-	3	30	70	100
4	23CSM363C	Quantum Computing	3	-	-	3	30	70	100
5	23CSM363D	Reinforcement Learning	3	-	-	3	30	70	100

Professional Elective – IV - Semester VII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CSM471A	AI& ML in Cyber Security& Threat Detection	3	-	-	3	30	70	100
2	23CAI472A	AI-driven Software Engineering & DevOps	3	-	-	3	30	70	100
3	23CAI472B	AI for Robotics	3	-	-	3	30	70	100
4	23CAI472D	Explainable AI & Model Interpretability	3	-	-	3	30	70	100

Professional Elective – V - Semester VII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23CAI473A	AI for Smart Cities & IoT Systems	3	-	-	3	30	70	100
2	23CSM472A	ML Ops & AI Model Deployment	3	-	-	3	30	70	100
3	23CSD473A	Data Wrangling	3	-	-	3	30	70	100
4	23CAI473B	AI in Healthcare	3	-	-	3	30	70	100

Management Science Elective – Semester VII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	23HSM471A	Business Ethics and Corporate Governance	3	-	-	3	30	70	100
2	23HSM471B	E-Business	3	-	-	3	30	70	100
3	23HSM471C	Management Science	3	-	-	3	30	70	100

Open Elective – I - Semester V (Third Year)

S.No	CourseCode	Offered Department	Course Title	Scheme of Instructios Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	23OCE351A	CE	Green Buildings	3	-	-	3	30	70	100
2	23OCE351B		Construction Technology and Management	3	-	-	3	30	70	100
3	23OEE351A	EEE	Electrical Safety Practices and Standards	3	-	-	3	30	70	100
4	23OEC351A	ECE	Electronic Circuits	3	-	-	3	30	70	100
5	23OME351A	ME	Sustainable Energy Technologies	3	-	-	3	30	70	100
6	23OSH351A	Mathematics	Mathematics for Machine Learning and AI	3	-	-	3	30	70	100
7	23OSH351B	Physics	Materials Characterization Techniques	3	-	-	3	30	70	100
8	23OSH351C	Chemistry	Chemistry of Energy Systems	3	-	-	3	30	70	100
9	23OSH351D	Humanities	English for Competitive Examinations	3	-	-	3	30	70	100
10	23OSH351E		Entrepreneurship and New Venture Creation	3	-	-	3	30	70	100

Open Elective – II - Semester VI (Third Year)

S.No	CourseCode	Offered Department	Course Title	Scheme of Instructios Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	23OCE361A	CE	Disaster Management	3	-	-	3	30	70	100
2	23OCE361B		Sustainability In Engineering Practices	3	-	-	3	30	70	100
3	23OEE361A	EEE	Renewable Energy Sources	3	-	-	3	30	70	100
4	23OEC361A	ECE	Digital Electronics	3	-	-	3	30	70	100
5	23OME361A	ME	Principles of Automation and Robotics	3	-	-	3	30	70	100
6	23OSH361A	Mathematics	Optimization Techniques for Engineers	3	-	-	3	30	70	100
7	23OSH361B		Mathematical Foundation Of Quantum Technologies	3	-	-	3	30	70	100
8	23OSH361C	Physics	Physics of Electronic Materials And Devices	3	-	-	3	30	70	100
9	23OSH361D	Chemistry	Chemistry of Polymers and Applications	3	-	-	3	30	70	100
10	23OSH361E	Humanities	Academic Writing and Public Speaking	3	-	-	3	30	70	100

Open Elective – III - Semester VII (Fourth Year)

S.No	CourseCode	Offered Department	Course Title	Scheme of Instructios Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	23OCE471A	CE	Building Materials and Services	3	-	-	3	30	70	100
2	23OCE471B		Environmental Impact Assessment	3	-	-	3	30	70	100
3	23OEE471A	EEE	Smart Grid Technologies	3	-	-	3	30	70	100
4	23OEC471A	ECE	Fundamentals of Microprocessors and Controllers	3	-	-	3	30	70	100
5	23OME471A	ME	3D Printing Technologies	3	-	-	3	30	70	100
6	23OSH471A	Mathematics	Wavelet transforms and its Applications	3	-	-	3	30	70	100
7	23OSH471B	Physics	Smart Materials and Devices	3	-	-	3	30	70	100
8	23OSH471C		Introduction to Quantum Mechanics	3	-	-	3	30	70	100
9	23OSH471D	Chemistry	Green Chemistry and Catalysis for Sustainable Environment	3	-	-	3	30	70	100
10	23OSH471E	Humanities	Employability Skills	3	-	-	3	30	70	100

Open Elective – IV - Semester VII (Fourth Year)

S.No	CourseCode	Offered Department	Course Title	Scheme of Instructios Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	23OCE472A	CE	Geo-Spatial Technologies	3	-	-	3	30	70	100
2	23OCE472B		Solid Waste Management	3	-	-	3	30	70	100
3	23OEE472A	EEE	Electric Vehicles	3	-	-	3	30	70	100
4	23OEC472A	ECE	Transducers and Sensors	3	-	-	3	30	70	100
5	23OME472A	ME	Fundamentals of Quality Management	3	-	-	3	30	70	100
6	23OSH472A	Mathematics	Financial Mathematics	3	-	-	3	30	70	100
7	23OSH472B	Physics	Sensors And Actuators For Engineering Applications	3	-	-	3	30	70	100
8	23OSH472C	Chemistry	Chemistry Of Nanomaterial's and Applications	3	-	-	3	30	70	100
9	23OSH472D	Humanities	Literary Vibes	3	-	-	3	30	70	100
10	23OPEN472	OPEN	Introduction to Quantum Computing	3	-	-	3	30	70	100

S.No	Subject Area	Credit Mapping								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	0.5	3.5	3	-	-	-	2	-	9
2	BSC	11	3	3	5	-	-	-	-	22
3	ESC	9	8.5	-	5	3	1	-	-	26.5
4	PCC	-	4.5	12	9	12	12	3	-	52.5
5	SEC	-	-	2	2	2	2	2	-	10
6	PEC	-	-	-	-	3	6	6	-	15
7	OEC	-	-	-	-	3	3	6	-	12
8	PWC	-	-	-	-	2	-	2	12	16
9	AC	-	-	Y	-	Y	-	Y	-	-
TOTAL		20.5	19.5	20	21	25	24	21	12	163

NOTE: **HSMC** – Humanities, Social Science and Management Science Courses; **BSC** – Basic Science Courses; **ESC** – Engineering Science Courses; **PCC** – Professional Core Courses; **SEC** – Skill Enhancement Course; **PEC** – Professional Elective Courses; **OEC** – Open Elective Courses; **PWC** – Project Work Courses & **AC** – Audit Courses



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(AUTONOMOUS)

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

B.Tech - R23 Regulations

(Applicable for 2023-2024 Regular Students & 2024-2025 Lateral Students)



Academic Regulations (R23) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year
2023-2024 onwards)

1. AWARD OF THE DEGREE

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

- (i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
- (ii) Registers for **160 credits and secures all 160 credits.**

(b) Award of B.Tech. degree with Honors

A student will be declared eligible for the award of the B.Tech. with Honors if he/she fulfils the following:

- (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
- (ii) Registering for Honors is optional.
- (iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. ADMISSIONS

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. PROGRAM RELATED TERMS

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1 credit

- a) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
- b) **Choice Based Credit System (CBCS):** The CBCS provides a choice for students to select from the prescribed courses.

5. SEMESTER/CREDITS:

- i) A semester comprises 90 working days and an academic year is divided into two semesters.
- ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.
- iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

6. STRUCTURE OF THE UNDERGRADUATE PROGRAMME

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8 - 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%
3.	Engineering Sciences (ES)	23.5	14%	10 - 18%
4.	Professional Core (PC)	54.5	34 %	30 - 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8 - 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

7. COURSE CLASSIFICATION:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Core Courses	Foundation courses	Includes Mathematics, Physics and Chemistry. Fundamental engineering courses; humanities, social sciences, and management courses
2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline / department / branch of Engineering.
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary Subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain Specific skill Enhancement Courses (SEC)	Interdisciplinary/Job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships - Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit Courses	Covering subjects of developing desired attitude among the learners

8. PROGRAMME PATTERN

- i. Total duration of the of B. Tech (Regular) Programme is four academic years.
- ii. Each academic year of study is divided into two semesters.
- iii. Minimum number of instruction days in each semester is 90 days.

- iv. 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., are included as per the guidelines issued by AICTE.
- v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.
- vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
- vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
- viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.
- ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.
- x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
- xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
- xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
- xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
- xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
- xv. Undergraduate degree with Honors is introduced by the Institution for the students having good academic record.

- xvi. Departments shall take measures to implement Virtual Labs (<https://www.vlab.co.in>) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.
- xvii. Institution shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.
- xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

9. EVALUATION PROCESS

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship & Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses:

Assessment Method	Marks
Continuous Internal Assessment (CIA)	30
Semester End Examination (SEE)	70
Total	100

- i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.
- iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for practical subject.

a) Continuous Internal Evaluation

- i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.
- ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
 - The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
 - The objective paper shall be conducted either online or offline by the respective institution on the day of subjective paper test.
 - If conducted offline, the midterm examination shall be conducted first by distribution of the Objective paper, simultaneously marking the attendance, after 20 minutes the answered objective paper shall be collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90 minutes the answered booklets are collected back.
 - Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.
- iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.
 - iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

- v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25 Marks
obtained in second mid: 20

Final mid semester Marks: $(25 \times 0.8) + (20 \times 0.2) = 24$

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other.

For Example:

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

Final mid semester Marks: $(25 \times 0.8) + (0 \times 0.2) = 20$

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

- i) There shall be 6 questions and all questions are compulsory.
- ii) Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.
- iii) There shall be 2 short answer questions from each unit.
- iv) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- v) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical & Electronics Engineering and Basic Civil & Mechanical Engineering shall have the following pattern:

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

Practical Courses:

Assessment Method	Marks
Continuous Internal Assessment (CIA)	30
Semester End Examination (SEE)	70
Total	100

- a) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.
- b) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the regularity/record/viva and 15 marks for the internal test.
- c) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.
- Procedure: 20 marks
 - Experimental Work & Results: 30 marks
 - Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours.

The end examination shall be evaluated 35 marks in each part. Mid semester examination shall be evaluated as above for 30 marks (day-to-day evaluation 15 marks and internal examination 15 marks) in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

- d) For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	Marks
Continuous Internal Assessment (CIA)	30
Semester End Examination (SEE)	70
Total	100

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class.

And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches, etc is mentioned along with the syllabus.

- e) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.
- f) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

10. SKILL ORIENTED COURSES

- i) There shall be five skill-oriented courses offered during III to VII semesters.
- ii) Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.
- iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

- iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
- v) 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 or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. 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.
- vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.
- vii) 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 University.

11. MASSIVE OPEN ONLINE COURSES (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the Institution. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

12. CREDIT TRANSFER POLICY

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

- i) The Institution shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
- ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
- iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.
- iv) The concerned department shall identify the courses permitted for credit transfer.
- v) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- vii) The university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will re-issue the marks sheet for such students.
- viii) Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.
- ix) The institution shall submit the following to the examination section of the university:
 - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
 - b) Undertaking form filled by the students for credit transfer.

- x) The institutions shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the Institution from time to time.

13. ACADEMIC BANK OF CREDITS (ABC)

The Institution has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

- i) Provide option of mobility for learners across the universities of their choice
- ii) Provide option to gain the credits through MOOCs from approved digital platforms.
- iii) Facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
- iv) Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

14. MANDATORY INTERNSHIPS SUMMER INTERNSHIPS

Summer Internships: Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

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 comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department.

A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weight each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the Institutions.

Full Semester Internship and Project work:

In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Presentation/Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

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

15. GUIDELINES FOR OFFERING A MINOR

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

- i) The Minor program requires the completion of 12 credits in Minor stream chosen.
- ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.

iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.

16. GUIDELINES FOR OFFERING HONORS

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

- i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.
- ii) A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).
- iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.
- iv) The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.
- v) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
- vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
- vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
- viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.

- ix) A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.
- x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xi) The Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering

Enrolment into Honors:

- i) Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline
- ii) The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.
- iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.
- iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.
- v) Honors is to be completed simultaneously with a Major degree program.

Registration for Honors:

- i) The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.
- ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.
- iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
- iv) There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

17. ATTENDANCE REQUIREMENTS:

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee (CAC).
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the Institution.
- iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
- viii) For induction programme attendance shall be maintained as per AICTE norms.

18. PROMOTION RULES:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university norms.
- ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) up to in the subjects that have been studied up to III semester.
- iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

- iv) And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.
- v) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

19. GRADING:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

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

(a) Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
90 & above	Superior	10
80 - 89	A (Excellent)	9
70 - 79	B (Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

- i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
- ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.
- iii) Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):
- iv) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

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

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

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

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

where " S_i " is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

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

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

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

(b) Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5 (Without any Supplementary Appearance)
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

Note: * Students who have written supplementary examinations to fulfil the credit requirement will not be awarded First Class with Distinction. For such students the highest degree that is awarded will be First Class Only.

CGPA to Percentage conversion Formula – $(CGPA - 0.5) \times 10$

20. WITH-HOLDING OF RESULTS

If the candidate has any dues not paid to the institution or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

21. MULTIPLE ENTRY / EXIT OPTION

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

- i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6- credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6- credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- iii) **Bachelor of Science (in Field of study/discipline) i.e., B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Universities / Institution shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

22. GAP YEAR CONCEPT:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish startups. 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 principal of the respective college shall forward such proposals submitted by the students to the University.

An evaluation committee constituted by the University shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not.

23. TRANSITORY REGULATIONS

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for 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, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

24. MINIMUM INSTRUCTION DAYS FOR A SEMESTER:

The minimum instruction days including exams for each semester shall be 90 days.

25. MEDIUM OF INSTRUCTION

The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

26. STUDENT TRANSFERS:

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

27. GENERAL INSTRUCTIONS:

- a) The academic regulations should be read as a whole for purpose of any interpretation.
- b) Malpractices rules-nature and punishments are appended.
- c) Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
- d) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.

- e) The Institution may change or amend the academic regulations 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 Universities.
- f) In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Head of the institution is final.

Academic Regulations (R23) for B. Tech (Lateral Entry Scheme)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2024-2025 onwards)

1. AWARD OF THE DEGREE

- (a) **Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils th following:**
- (i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
 - (ii) Registers for 120 credits and secures all 120 credits.
- (b) **Award of B.Tech. degree with Honors**
A student will be declared eligible for the award of the B.Tech. with Honors if he/she fulfils the following:
- (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.
 - (ii) Registering for Honors is optional.
 - (iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. MINIMUM ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.2

- (i) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.
- (ii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. COURSE PATTERN

- (i) The entire course of study is three academic years on semester pattern.
- (ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- (iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfilment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

- 5.** All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

I B. Tech I/II sem

23BSC111	APPLIED CHEMISTRY	L	T	P	C
	(Common to EEE, ECE, CSE, CSE (AI&ML), CSE (AI) and CSE (DS))	3	0	0	3

COURSE EDUCATIONAL OBJECTIVES:

1. To train the students about the concept of Quantum Mechanics and Molecular Orbital theory.
2. To familiarize Knowledge and applications of modern engineering materials
3. To understand the concept of Electro Chemistry with its applications such as battery, fuel cells and sensors
4. To develop knowledge on the concept and applications of polymers
5. To introduce instrumental methods such as UV, IR and Chromatography with applications

UNIT-I:STRUCTURE AND BONDING MODELS (9)

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2 , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O₂ and CO, etc. n- molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT-II:MODERN ENGINEERING MATERIALS (9)

Semiconductors, band diagram in solids, Semiconductor devices (p-n junction diode as rectifier and transistors)

Super conductors-Introduction basic concept, applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

UNIT-III:ELECTROCHEMISTRY AND APPLICATIONS (9)

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT-IV:POLYMER CHEMISTRY (9)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

UNIT-V:INSTRUMENTAL METHODS AND APPLICATIONS (9)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

On successful completion of the course the students will be able to		POs
CO1	Demonstrate knowledge based on quantum mechanics and molecular orbital theory	PO1, PO2
CO2	Demonstrate knowledge on engineering materials with applications	PO1, PO2, PO6
CO3	Demonstrate knowledge on electrochemistry with analytical skills and applications such as battery, fuel cells and sensors	PO1, PO2, PO6
CO4	Demonstrate knowledge on polymers with applications related to society and sustainability	PO1, PO2, PO6, PO7
CO5	Demonstrate knowledge on principles and instrumentations of spectroscopy and chromatography	PO1, PO2

TEXT BOOKS:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.M. Lehn, Supra Molecular Chemistry, VCH Publications

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

I B.Tech I/II sem

23BSC113	ENGINEERING PHYSICS	L	T	P	C
	(Common to All Engineering Branches)	3	0	0	3

COURSE EDUCATIONAL OBJECTIVES:

1. To study the intensity variation of light due to interference, diffraction and polarization
2. To understand the fundamental of crystals and their structures.
3. To recognize various types of polarization of dielectrics and classification of the magnetic materials.
4. To study the principles of quantum mechanics and implementing it the one-dimensional motion of particles and the band theory of solids.
5. To provide an overview of semiconductor and identification of type of semiconductor using Hall effect.

UNIT-I : Wave Optics

Interference: Introduction - Principle of superposition - Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit- Diffraction Grating -Applications

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates. -Applications

UNIT-II :Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters - Bravais Lattices - crystal systems (3D) - coordination number - packing fraction of SC, BCC & FCC - Miller indices - separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer - crystal structure determination by Laue's and powder methods.

UNIT-III:Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant - Frequency dependence of polarization - dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT-IV:Quantum Mechanics and Free electron theory

Quantum Mechanics: Dual nature of matter - Heisenberg's Uncertainty Principle - Significance and properties of wave function - Schrodinger's time independent and dependent wave equations- Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) - Quantum free electron theory - electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

I B.Tech I sem

23BSC114	LINEAR ALGEBRA & CALCULUS (Common to All Branches of Engineering)	L T P C 2 1 - 3
-----------------	--	----------------------------------

COURSE EDUCATIONAL OBJECTIVES:

1. To familiarize the concepts of matrices and mean value theorems and their applications in engineering.
2. To equip the students to solve various application problems in engineering through evaluation of multiple integrals etc.,
3. To equip the students with standard concepts and tools of mathematics to handle various real-world problems and their applications.

UNIT-I: MATRICES (9)

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method. Iterative methods: Jacobi and Gauss Seidel Methods.

UNIT-II: EIGEN VALUES, EIGEN VECTORS AND ORTHOGONAL TRANSFORMATION (9)

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

UNIT-III: CALCULUS (9)

Mean Value Theorems: Rolle’s Theorem, Lagrange’s mean value theorem with their geometrical interpretation, Cauchy’s mean value theorem, Taylor’s and Maclaurin’s theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT-IV: PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS) (9)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor’s and Maclaurin’s series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT-V: MULTIPLE INTEGRALS (MULTIPLE VARIABLE CALCULUS) (9)

Double integrals, Triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.
AUTONOMOUS
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

I B.Tech - I Semester

23ESC114
INTRODUCTION TO PROGRAMMING
(Common to all Branches)

L T P C
2 1 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce students to the fundamentals of computer programming.
2. To provide logical thinking and problem-solving skills using control structures.
3. To familiarize students with programming concepts such as data types, arrays and strings.
4. To introduce the concepts of pointers and user-define data types.
5. To encourage the students with functions and file handling mechanisms.

UNIT- 1 Introduction to Programming and Problem Solving (10)

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operators and Expressions, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT- 2 Control Structures (8)

Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while). Break and Continue.

UNIT- 3 Arrays and Strings (9)

Arrays indexing, memory model, programs with array of integers, two dimensional arrays. Strings-Declaring and Initializing String Variables, Reading string from terminal, Writing string to the screen, String Handling Functions.

UNIT-4 Pointers & User Defined Data types (9)

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers. User-defined data types-Structures and Unions.

UNIT-5 Functions & File Handling (9)

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables. File Handling- Basic Operations on Files – File Handling Function.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand basics of computers, the concept of algorithm and algorithmic thinking.	PO1, PO2
CO2	Analyze a problem and develop an algorithm and program using control structures to solve it.	PO1, PO2, PO3
CO3	Implement various programming concepts using arrays and strings.	PO1, PO2, PO3, PO4
CO4	Understand and implement more advanced features of pointers and user-defined data types.	PO1, PO2, PO5
CO5	Develop problem-solving using functions and file handling concepts.	PO1, PO3, PO4, PO5



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

TEXT BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

REFERENCE BOOKS:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

REFERENCE WEBSITES:

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

CO-PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

I B.Tech. - I Semester

23ESC111	BASIC CIVIL AND MECHANICAL ENGINEERING (Part-B) (Common to All Branches)	L T P C 3 - - 3
-----------------	---	----------------------------

**BASIC CIVIL ENGINEERING
(Part-A)**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To study the Overview of civil engineering and basic concepts on construction materials.
2. To study the basic concepts in the field of surveying & Foundation Engineering
3. To study the basic transportation, water resources and environmental engineering.

UNIT –1: INTRODUCTION TO CIVIL ENGINEERING (8)

BASICS OF CIVIL ENGINEERING: Overview of civil engineering – Civil engineering contributions to the welfare of society – Various disciplines of civil engineering – Basic concepts and scope of structural engineering, geo-technical engineering, transportation engineering, hydraulics , water resources engineering, and environmental engineering

CONSTRUCTION TECHNOLOGY: Fundamental concepts of building planning for residential buildings and Sequences of Work in Building Construction – Introduction to Prefabricated construction Techniques & Green buildings concept **Construction Materials:** Cement – Aggregate – Bricks – Cement – Concrete – Steel – Timber – Modern materials. (Brief discussion only)

UNIT –2: SURVEYING & FOUNDATION ENGINEERING (8)

SURVEYING: Objectives of surveying – Horizontal measurements – Angular measurements – Introduction to bearings levelling instruments used for levelling – Simple problems on levelling and bearings– Contour mapping. (Brief discussion only)

FOUNDATIONS ENGINEERING: Bearing capacity of soil, functions of foundations, types – shallow and deep- Load bearing and framed structures (Brief discussion only)

UNIT –3: TRANSPORTATION AND WATER RESOURCES AND ENVIRONMENTAL ENGINEERING (8)

TRANSPORTATION ENGINEERING: Importance of transportation in Nation's economic development – Types of highway pavements – Flexible pavements and rigid pavements – Simple differences– Basics concepts on harbor, tunnel, airport, and railway engineering. (Brief discussion only)

WATER RESOURCES AND ENVIRONMENTAL ENGINEERING: Introduction on water resources and environmental engineering – Sources of water – Quality of water and Specifications – Introduction to hydrology – Rainwater harvesting – Water storage and conveyance structures – Fundamental concepts on dams and reservoirs. (Brief discussion only)

Total Hours: 24

(Note: The subject covers only the basic principles of Civil Engineering. The evaluation shall be intended to test only the fundamentals of the subject)

**SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

I B.Tech. - I Semester

23ESC111	BASIC CIVIL AND MECHANICAL ENGINEERING (Part-B) (Common to All Branches)	L T P C 3 - - 3
-----------------	---	----------------------------

**BASIC MECHANICAL ENGINEERING
(Part-B)**

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

1. To study the basic concepts materials, machining, and scope of mechanical engineering.
2. To study the basic concepts in the field of thermal engineering.
3. To study the basic principles of power plants, mechanical transmission system and fundamentals of robotics.

UNIT –1: INTRODUCTION TO MATERIALS & MANUFACTURING ENGINEERING (8)

Introduction to Mechanical Engineering: Role of mechanical engineering in industries and society – Technologies and scope in different sectors such as energy, manufacturing, design, automotive, aerospace, and marine. **Engineering Materials:** Introduction on metals-ferrous and non-ferrous, ceramics, composites, smart materials. **Manufacturing Processes:** Basic principles and applications of casting, forming, joining processes, and machining – Introduction to CNC machines, 3D printing, and smart manufacturing.

UNIT –2: INTRODUCTION TO THERMAL ENGINEERING (8)

Thermal Engineering: Working principle of boilers. **Refrigeration:** Refrigeration and air-conditioning cycles – Units of refrigeration – Refrigerants – Vapour-compression and absorption system. **Air Conditioning:** Terminology in air conditioning – Working principle of window, split, and central air conditioning system. **IC Engines:** Basic concepts on Otto cycle and Diesel cycle – Components of IC engines – SI/CI Engines – Working principle of two/four stroke petrol and diesel engines – Differences between petrol and diesel engines – Basic concepts on electric and hybrid vehicles.

UNIT –3: POWER PLANTS, MECHANICAL TRANSMISSION AND ROBOTICS (8)

Power Plants: Working principle of steam, diesel, hydro, gas turbine, and nuclear power plants. **Mechanical Power Transmission:** Belt drives, chain, rope drives, gear drives and their applications. **Introduction to Robotics:** Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Total Hours: 24

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the concepts of engineering materials and basic manufacturing process.	PO1, PO2, PO3
CO2	Describe the basic concepts of thermal engineering, refrigeration, air conditioning and IC engines.	PO1, PO2, PO3
CO3	Describe the working of different mechanical power transmission systems, power plants, and fundamentals of robotics.	PO1, PO2, PO3

TEXT BOOKS:

1. G.Shanmugam and M.S.Palanichamy, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi , 1996.
2. Venugopal K,Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Chennai, 2000.

REFERENCE BOOKS:

1. Materials Science and Engineering: An Introduction, William D. Callister, 9/e, 2014,Wiley India Pvt. Ltd.
2. Serope Kalpakjian and Steven R. Schmid, "Manufacturing Engineering and Technology (SI Edition)", Pearson Education, New Delhi, 7/e, 2018.
3. Ian Gibson, David W.Rosen and Brent Stucker, "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing", Springer, 2/e, 2015.
3. V. Ganesan, "Internal Combustion Engines", Tata McGraw-Hill Education Pvt. Ltd., 4/e, 2012.
4. C P Arora, "Refrigeration and Air Conditioning", Tata McGraw-Hill Education Pvt. Ltd., Noida, 3/e, 2008.
5. M.Ehsani, Y.Gao,S.Gayand AliEmadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles" Fundamentals, Theory and Design", CRC Press, 2005
6. P.K.Nag, "Power Plant Engineering", McGraw-Hill Education Pvt. Ltd., New Delhi,4/e, 2014.
7. S.S.Rattan, "Theory of Machines and Mechanisms', Tata McGraw-Hill Education Pvt.Ltd, Noida, 5/e, 2019.
8. Industrial Robotics: Technology, Programming and Applications, Mikell P Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G Odrey and Ashish Dutta 2/e, 2012, Tata McGraw-Hill Education Pvt. Ltd.,

REFERENCE WEBSITE:

1. <https://nptel.ac.in/courses/112103316>
2. <https://nptel.ac.in/courses/112106293>
3. <https://nptel.ac.in/courses/112104290>

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	1
CO.2	3	-	-	-	-	-	-	-	-	-	-	1
CO.3	3	-	-	-	-	-	-	-	-	-	-	1
CO*	3	-	-	-	-	-	-	-	-	-	-	1

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

I B.Tech I/II sem

23BSC115

**APPLIED CHEMISTRY LAB
(Common to EEE, ECE, CSE,
CSE (AI&ML), CSE (AI) and CSE (DS))**

**L T P C
- - 2 1**

COURSE EDUCATIONAL OBJECTIVES:

1. Verify the fundamental concepts with experiments.
2. To provide solid foundation in chemistry laboratory to solve engineering problems
3. To apply theoretical principles in preparing polymers and nonmaterial's
4. To apply theoretical principles in estimating strength of acid, ferrous ion
5. To apply theoretical concept and principles in determining cell constant and conductance of solution, strength of acids by conduct metric titrations and PH metric titrations, redox potential, emf and viscosity
6. To experience the importance of theory by utilizing analytical tools such as pb-acid battery, colorimeter, ostwalds viscometer, potentiometer, conductivity meter and PH meter
7. To experience the importance of theory by performing spectroscopic investigations, using modern instrumental tools such as UV-spectrophotometer and IR spectrometer

LIST OF EXPERIMENTS

1. Measurement of 10Dq by spectrophotometric method.
2. Conduct metric titration of strong acid (HCl) vs. strong base (NaOH)
3. Conduct metric titration of weak acid (CH₃COOH) vs. strong base (NaOH)
4. Determination of cell constant and conductance of potassium chloride solutions
5. Potentiometry-determination of redox potentials and emfs (emf titration of Fe²⁺ with cr₂O₇²⁻)
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer (Bakelite).
8. Verification Lambert-Beer's law for KMnO₄ by colorimetry.
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of ZnO nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry
13. Determination of molecular weight of a polymer using Ostwald viscometer
14. pH metric titration of strong acid (HCl) vs strong base (NaOH)

Note: Any **TEN** of the listed experiments are to be conducted, out of which any **TWO** experiments may be conducted in virtual mode.

REFERENCE BOOK:

1. "Vogel's Quantitative Chemical Analysis, 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

COURSE OUTCOMES:

On the successful completion of the course students will be able to		POs
CO1	Demonstrate knowledge on preparation of bakerite and nanomaterial	PO1
CO2	Analyse ferrous iron colorimetry and ferrous iron by dichrometry, analyse acid in lead acid battery	PO2
CO3	Conduct investigations of lead in lead acid battery, wave length determination in spectrophotometer, conductometric titrations of acids and bases	PO4
CO4	Analyse using tools such as UV and IR spectrophotometers	PO5
CO5	Follow the ethical principles in implementing the programmes	PO8

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

CO6	Conduct experiments effectively as an individual and as a team member in a group	PO9
CO7	Communicate verbally and in written form the understanding about the experiments	PO10
CO8	Continue updating their skill related to nanomaterials and battery and implementing programmes in future	PO12

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

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

I B.Tech I/II sem

23BSC117

ENGINEERING PHYSICS LAB
(Common to All Engineering Branches)

L	T	P	C
-	-	2	1

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

1. **To** Operate optical instruments like travelling microscope and spectrometer.
2. To Estimate the wavelengths of different colors using diffraction grating.
3. To Plot the intensity of the magnetic field of circular coil carrying current with distance.
4. To Calculate the band gap of a given semiconductor.
5. To verify the laws of stretched strings

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a given Plano convex lens by Newton's rings.
2. Determination of thickness of a thin wire using wedge method
3. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
4. Determination of wavelength of Laser light using diffraction grating.
5. Determination of energy gap of a semiconductor using p-n junction diode.
6. Determination of particle size using laser source
7. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
8. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
9. Sonometer: Verification of laws of stretched string.
10. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration
11. Determination of temperature coefficients of a thermistor.
12. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any **TEN** of the listed experiments are to be conducted. Out of which any **TWO** experiments may be conducted in virtual mode.

REFERENCE BOOK:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

WEB RESOURCE:

1. **URL:** www.vlab.co.in

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
C01	Demonstrate Knowledge on measurement of various physical quantities using optical methods and fundamentals of magnetic fields	PO1
C02	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	PO2
C03	Provide valid conclusions on phenomena Interference and Diffraction	PO4
C04	Follow the ethical principles in implementing the programs	PO8
C05	Do experiments effectively as an individual and as a team member in a group.	PO9
C06	Communicate verbally and in written form, the understanding about the experiments.	PO10
C07	Continue updating their skill related to loops, pointers and files implementing programs in future.	PO12

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	-	3	-	-	-	-	-	-	-	-
C04	-	-	-	-	-	-	-	3	-	-	-	-
C05	-	-	-	-	-	-	-	-	3	-	-	-
C06	-	-	-	-	-	-	-	-	-	3	-	-
C07	-	-	-	-	-	-	-	-	-	-	-	3
C08	-	-	-	-	-	-	-	-	-	-	-	3
CO	3	3	-	3	-	-	-	3	3	3	-	3



PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on flowchart and algorithm to the given problem
2. To exercise conditional and iterative statements to write C programs
3. To develop the skill of C programs using arrays, strings and functions.
4. To understand C programs using pointers, Structures and union.
5. To familiarize with file handling techniques.

Week 1

Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(), scanf()

Week 2

Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

- i) Sum and average of 3 numbers
- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple interest Calculation

Week 3

Simple computational problems using arithmetic expressions.

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

Week 4

Simple computational problems using the operator' precedence and associativity

- i) Evaluate the following expressions.
 - a. $A+B*C+(D*E) + F*G$
 - b. $A/B*C-B+A*D/3$
 - c. $A+++B---A$
 - d. $J= (i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5

Problems involving if-then-else structures.

- i) Write a C program to find the max and min of four numbers using if-else.
- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

Week 6

Iterative problems e.g., the sum of series

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers

Week 7

1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

Week 8

Matrix problems, String operations, Bubble sort

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

Week 9

Pointers

- i) Write a C program to find the sum of a 1D array using pointers
- ii) Enter n students data using Pointers and display failed students list
- iii) Demonstrate the arithmetic operations using pointers.
- iv) Write a C Program using Pointers to Read in an Array of Integers and Print its Elements in Reverse Order

Week 10

Structures and Unions

- i) Demonstrate the differences between structures and unions using a C program.
- ii) Write a C program to find the total, average of n students using structures
- iii) Write a C program to copy one structure variable to another structure of the same type.
- iv) Write a C program to shift/rotate using bit fields.

Week 11

Simple functions using call by value, solving differential equations using Euler's theorem.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12

Recursive functions

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the GCD of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a recursive function to find the sum of series.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

Week 13

Simple functions using Call by reference.

- i) Write a C program to swap two numbers using call by reference.
- ii) Write a C program to copy one string into another using pointer.
- iii) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14

File operations

- i) Write a C program to write and read text into a file.
- ii) Write a C program to write and read text into a binary file using fread() and fwrite()
- iii) Copy the contents of one file to another file.
- iv) Write a C program to merge two files into the third
- v) Write a C program to print last n characters of a given file.

Total Hours: 45

COURSE OUTCOMES:

After the successful completion of this course, the students able to:		POs related to COs
CO1	Read and understand the execution of programs written in C language.	PO1
CO2	Analyze the programs on control statements and arrays.	PO2
CO3	Design C programs which utilize memory efficiently using programming constructs like pointers.	PO3
CO4	Develop the programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C	PO4
CO5	Analyze and implement the advanced concepts on functions and File handling techniques.	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to loops, pointers and files, implementing programs in future.	PO12

TEXT BOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

REFERENCE WEBSITES:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Accredited by NBA)

CO-PO MAPPING:

CO-PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09												3
CO*	3	3	3	3	3	-	-	3	3	3		3

**SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

I B.Tech. - I Semester

23ESC117

**ENGINEERING WORKSHOP
(Common to All Branches)**

L	T	P	C
-	-	3	1.5

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

1. To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical, and electrical engineering.

Trade for Exercises:

- 1. Demonstration:** Safety practices and precautions to be observed in workshop.
- 2. Carpentry:** Familiarity with different types of woods and tools used in wood working and make following joints.
 - a. Middle T lap joint or Half lap joint
 - b. Mortise and tenon joint
 - c. Dove tail joint or bridle joint
- 3. Sheet Metal:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
 - a. Tapered tray
 - b. Conical funnel
 - c. Elbow pipe
 - d. Brazing
- 4. Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
 - a. V fit
 - b. Dove tail joint
 - c. Semi-circular fit / Square fit
 - d. Bicycle tire puncture
- 5. House Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.
 - a. Parallel and series
 - b. Two-way switch
 - c. Godown lighting
 - d. Tube light
 - e. Three phase motor
 - f. Soldering of wires
- 6. Basic Machining:** Familiarity with different types of tools used in metal parts and practicing basic machining operation.
 - a. Simple plain turning / simple step turning.
 - b. Drilling and tapping
- 7. Plumbing:** Familiarity with plumbing tools, Preparation of pipe joints with coupling for same diameter and with reducer for different diameters and make the following tap connections
 - a. Single tap connections
 - b. Multi tap connections.

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

Trade for Demonstration:

- 1. Foundry Trade:** Demonstration and practice on moulding tools and processes, preparation of green sand moulds for single and split patterns.
- 2. Welding:** Demonstration and practice on Arc Welding and Gas welding
Preparation of Lap joint and Butt joint.

TEXT BOOKS:

- Serope Kalpak Jain and Steven R. Schmid, "Manufacturing Processing for Engineering Materials (SI Edition)", Pearson Education, New Delhi, 6/e, 2018.
- P.N. Rao, "Manufacturing Technology - Foundry, Farming and Welding, Volume-I", Tata McGraw-Hill Education Pvt. Ltd., Noida, 5/e, 2018.

REFERENCE BOOKS:

- Hajra Choudhury S.K and Nirjhar Roy, "Elements of Workshop Technology, Volume-I", Media Promoters and Publishers Pvt.Ltd, 15/e, 2010.
- Roy A Lindberg, "Process and Materials of Manufacturing", Pearson Education, New Delhi, 4/e, 2015.
- R.K. Jain, "Production Technology", Khanna publishers, New Delhi, 17/e, 2011.
- R.K. Rajput, "A Textbook of Manufacturing Technology: Manufacturing Processes", Laxmi Publications (P) Ltd., New Delhi, 2/e, 2017.
- "A Text book of Manufacturing Technology-I", P.C.Sharma, S.Chand & Company Pvt. Ltd., New Delhi, 1/e, 2011.

REFERENCE WEBSITE:

- <https://nptel.ac.in/courses/112/104/112104301/>
- <https://nptel.ac.in/courses/112/107/112107219/>

COURSE OUTCOMES:

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

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	-	3	-	-	-	-	-	-	-
C05	-	-	-	-	-	-	-	3	-	-	-	-
C06	-	-	-	-	-	-	-	-	3	-	-	-
C07	-	-	-	-	-	-	-	-	-	3	-	-
C08	-	-	-	-	-	-	-	-	-	-	-	3
CO	3	3	3	-	3	-	-	3	3	3	-	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)**

DEPARTMENT OF SCIENCE & HUMANITIES

I B.Tech I/II sem

23HSM113	Health And Wellness, Yoga and Sports (Common to All branches of Engineering)	L	T	P	C
		0	0	1	0.5

COURSE EDUCATIONAL OBJECTIVES:

1. To maintain their mental and physical wellness upright and develop ability in them to cope up with the stress arising in the life.
2. To create space in the curriculum to nurture the potential of the students in sports/games/yoga etc.
3. To introduce a practice oriented introductory course on the subject.

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Be Physical fit to perform daily routine without undue fatigue.
2. Be Mentally alert and Socially Cohesive
3. Consider success and failure equally.
4. Develop Positive Personality
5. Improve Leadership qualities

UNIT-I:

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

1. Organizing health awareness programmes in community
2. Preparation of health profile
3. Preparation of chart for balance diet for all age groups

UNIT- II:

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT-III:

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

1. Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

Practicing general and specific warm up, aerobics

2. Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.

A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)**

DEPARTMENT OF SCIENCE & HUMANITIES

I B.Tech II sem

23BSC121	DIFFERENTIAL EQUATIONS AND VECTOR (Common to All Branches of Engineering)	L T P C 2 1 - 3
-----------------	--	----------------------------

COURSE EDUCATIONAL OBJECTIVES:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE (9)

Linear differential equations – Bernoulli's equations - Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay, Electrical circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER (CONSTANT COEFFICIENTS) (9)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT-III: PARTIAL DIFFERENTIAL EQUATIONS (9)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method and Non-Linear (Standard forms) equations. Homogeneous Linear Partial differential equations with constant coefficients (Method of Separation of variables).

UNIT-IV: VECTOR DIFFERENTIATION (9)

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT-V: VECTOR INTEGRATION (9)

Line Integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

I B.Tech I/II sem

23HSM111	COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)	L T P C 2 0 0 2
-----------------	--	----------------------------------

COURSE EDUCATIONAL OBJECTIVES

The main objective of introducing this course, *communicative English*, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

UNIT-I: HUMAN VALUES-Gift of Magi (Short Story)

- 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.
- Writing:** Mechanics of Writing-Capitalization, Spelling Punctuation – Parts of Sentences.
- Grammar:** Parts of Speech, Basic Sentence Structures - forming questions
- Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT-II: NATURE-The Brook by Alfred Tennyson (Poem)

- Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
- Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks.
- Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
- Writing:** Structure of a paragraph - Paragraph writing (specific topics)
- Grammar:** Cohesive devices-linkers, use of articles and zero article; prepositions.
- Vocabulary:** Homonyms, Homophones, Homographs.

UNIT-III: BIOGRAPHY-Elon Musk

- Listening:** Listening for global comprehension and summarizing what is listened to.
- Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed
- Reading:** Reading at extended detail by making basic inferences-recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
- Writing:** Summarizing, Note-making, paraphrasing
- Grammar:** Verbs-tenses; subject-verb agreement; Compound words, Collocations
- Vocabulary:** Compound words, Collocations

UNIT-IV: INSPIRATION-The Toys of Peace by Saki

- 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/directions.
- Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
- Writing:** Letter Writing: Official Letters, Resumes
- Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice
- Vocabulary:** Words often confused, Jargons

UNIT-V: MOTIVATION-The Power of Intrapersonal Communication (An Essay)

- 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
- Reading:** Reading comprehension.
- Writing:** Writing structure of an essay on specific topics.
- Grammar:** Editing short texts–identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
- Vocabulary:** Technical Jargons

COURSE OUTCOMES:

On successful completion of the course the student will enable to		PO
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues.	PO1
CO2	Apply grammatical structures to formulate sentences and correct word forms.	PO5
CO3	Analyze course materials to speak clearly on a specific topic in informal discussions	PO2
CO4	Evaluate reading/listening texts and To write summaries based on global comprehension of these texts.	PO6
CO5	Create a coherent paragraph, essay, and resume.	PO4

TEXT BOOKS:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023
2. Empowering with Language by Cengage Publications, 2023

REFERENCE BOOKS:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic Writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

REFERENCE WEBSITES:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

CO-PO MAPPING

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.

(AUTONOMOUS)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech- I Semester

23ESC112

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

L	T	P	C
2	1	0	3

PART A: BASIC ELECTRICAL ENGINEERING

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Apply fundamental circuit theories to both DC and AC circuits, and analyze the complex circuit configurations.
2. Gain proficiency in understanding, operating, and analyzing electrical machines and their applications in various industries and understanding the concept of measuring instruments
3. Gain knowledge about various energy resources and understand the concept of electrical energy consumption, billing mechanism, and safety measures.

UNIT-1: DC & AC Circuits:

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase and phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT-2: Machines and Measuring Instruments:

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Moving Coil and Moving Iron Instruments, Dynamometer Wattmeter, Energy meter and Wheat Stone bridge.

UNIT-3: Energy Resources, Electricity Bill & Safety Measures:

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Thermal, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.



PART B: BASIC ELECTRONICS ENGINEERING

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Gain the knowledge on basic semiconductor devices
2. Acquire the knowledge on electronic circuits and instrumentation.
3. Understand the principles of digital electronics, combinational circuits and sequential circuits

UNIT-1: SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal CE Amplifier.

UNIT-2: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT-3: DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Course Outcomes:

On successful completion of the course the student could be		POs
CO1	Understand the concept and working of diodes, transistors, and their applications.	PO1, PO2, PO3, PO12
CO2	Analyze the electronic circuits and instrumentation	PO1, PO2, PO3, PO12
CO3	Familiarize with the number systems, codes, Boolean algebra and logic gates and understand the working of different combinational & sequential circuits.	PO1, PO2, PO3, PO12

TEXTBOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

I B.Tech. – I / II Semester

23ESC113

ENGINEERING GRAPHICS
(Common to All Branches)

L T P C
1 - 4 3

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

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

UNIT –1: ENGINEERING CURVES AND SCALES (9)

Introduction: Introduction about lines, lettering and dimensioning – Geometrical constructions and constructing regular polygons by general methods. **Engineering Curves:** Construction of ellipse, parabola and hyperbola by general method – Construction of cycloids – Construction involutes – Drawing of tangents and normal to the above curves. **Scales:** Plain scales, and diagonal.

UNIT –2: PROJECTION OF POINTS, LINES AND PLANE SURFACES (12)

Projection of Points: Principles of orthographic projection – Reference lines and Plane – Projections of points. **Projection of Lines:** Projections of lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane – Determination of true lengths, true inclinations by rotating line and trapezoidal method. **Projection of Planes:** Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT –3: PROJECTION OF SOLIDS (12)

Projection of Solids: Types of solids – Projection of simple solids (prisms, pyramids, cylinder and cone) – Axis perpendicular to horizontal plane, axis perpendicular to vertical plane and axis parallel to both the reference planes, projection of solids with axis inclined to one reference plane and parallel to another plane.

UNIT –4: SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES (12)

Section of Solids: Sectioning of right regular solids like prisms, pyramids, cylinder and cone – Solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other plane – Obtaining true shape of section. **Development of Surfaces:** Development of lateral surfaces of simple and sectioned solids like prisms, pyramids, cylinder and cone.

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

UNIT –5: ISOMETRIC PROJECTIONS AND ORTHOGRAPHIC PROJECTIONS (9)

Isometric Projection: Principles of isometric projection – Isometric scale – Isometric views of simple solids and truncated solids like prisms, pyramids, cylinder, sphere, and cone. **Orthographic Projections:** Visualization principles – Plane of projections – Representation of three-dimensional objects – Sketching of multiple views from pictorial views – Conversion of isometric views to orthographic views – Conversion of orthographic views to isometric views.

COMPUTER GRAPHICS (Not for Examination)

(3)

Practicing of simple 2D and 3D drawings of objects using Auto CAD

Total Hours: 60

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Construct the Engineering curves and generate tangent and normal for those curves.	PO1, PO2, PO3, P10, PO12
CO2	Draw the projection of points, lines and plane surfaces.	PO1, PO2, PO3, P10, PO12
CO3	Draw the projection of solids, like prisms, pyramids, cylinder, and cone.	PO1, PO2, PO3, P10, PO12
CO4	Draw the section of solids and development of surfaces.	PO1, PO2, PO3, P10, PO12
CO5	Draw the isometric projections and orthographic views.	PO1, PO2, PO3, P10, PO12

TEXT BOOKS:

1. N.D. Bhatt and V. M. Panchal, "Engineering Drawing", Charotar Publishing House, 50th edition, 2010.
2. M.B.Shah and B.C.Rana , "Engineering Drawing", Pearson Education, 2/e, 2009.

REFERENCE BOOKS:

3. K.L.Narayana and P.Kannaiah, "Engineering Drawing", 2/e, 2012, Scitech Publishers.
4. Luzzader, Warren.J and Duff,John M, "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. K.Venugopal and V.Prabhu Raja , "Engineering Graphics", New Age International (P) Limited, 2008.
6. Basant Agarwal and C.M.Agarwal , "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, , 2008,
7. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai. 2009.
8. Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD

SREENIVASAINSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)

REFERENCE WEBSITE:

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

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	3	-	-	-	-	-	-	1	-	1
CO.2	3	2	3	-	-	-	-	-	-	1	-	1
CO.3	3	2	3	-	-	-	-	-	-	1	-	1
CO.4	3	2	3	-	-	-	-	-	-	1	-	1
CO.5	3	2	3	-	-	-	-	-	-	1	-	1
CO*	3	2	3	-	-	-	-	-	-	1	-	1



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

I B.Tech. – II Semester

DATA STRUCTURES	L	T	P	C
(Common to CSE, CSE (AI&ML), CSE (AI) and CSE (DS))	2	1	0	3

PRE-REQUISITES: Computer Programming

COURSE OBJECTIVES:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of linked list concept.
3. To develop skills to apply appropriate data structures in problem solving using stacks.
4. To understand and implement the data structures using queue concept.
5. To provide knowledge about trees and hashing concepts.

UNIT-1 **(9)**

Introduction to Linear Data Structures: Definition and importance of Linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT- 2 **(9)**

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT- 3 **(9)**

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT- 4 **(9)**

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deque: Introduction to deque (double-ended queues), Operations on deque and their applications.

UNIT-5 **(9)**

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Total Hours: 45

Course Outcomes

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	PO1, PO2
CO2	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	PO1,PO2
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems	PO1,PO2,P O3,



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Accredited by NBA)

CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.	PO1, PO3,PO4
CO5	Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.	PO1,PO3,PO4,PO5

Text books:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

Reference Websites

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

CO-PO Mapping

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
DEPARTMENT OF SCIENCE & HUMANITIES**

I B.Tech I/II sem

23HSM112	COMMUNICATIVE ENGLISH LAB	L	T	P	C
	(Common to all Branches of Engineering)	-	-	2	1

COURSE EDUCATIONAL OBJECTIVES:

The main objective of introducing this course, *Communicative English Laboratory*, is to expose the students to a variety of self-instructional, learner friendly modes of language learning students will get trained in the basic communication skills and make them ready to face job interviews.

LIST OF TOPICS:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play, Conversational Practice and TED talks
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates-Methods & Practice
9. PPT Presentations/Poster Presentation
10. Interviews Skills

SUGGESTED SOFTWARES:

1. Walden Info tech
2. Young India Films

REFERENCE BOOKS:

1. MeenakshiRaman,Sangeeta-Sharma.TechnicalCommunication.OxfordPress.2018.
2. GrantTaylor:EnglishConversationPractice,TataMcGraw-HillEducationIndia,2016
3. Hewing's,Martin.CambridgeAcademicEnglish(B2).CUP,2012.
4. T.Balasubramanyam,ATextbookofEnglishPhoneticsforIndianStudents,(3rdEd)TrinityPress.

WEB RESOURCES:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

COURSE OUTCOMES:

On successful completion of the course the student will be able to		PO
CO1	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.	PO1
CO2	Apply communication skills through various language learning activities.	PO5
CO3	Analyze the English speech sounds, stress, rhythm, into nation and syllable division for better listening and speaking comprehension.	PO6
CO4	Evaluate and exhibit professionalism in participating in debates and group discussions.	PO2
CO5	Create effective resonance and prepare themselves to face interviews in future.	PO10

CO-PO Mapping

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



23ESC116 ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

(Common to All branches of Engineering)

L T P C
0 0 3 1.5

COURSE EDUCATIONAL OBJECTIVES:

- 1 Gain the knowledge on basic laws
- 2 Acquire the knowledge on theorems and Characteristics.
- 3 Analyze the Power and Power factor measurement
- 4 Analyze various characteristics of electrical circuits, electrical machines and measuring instruments
- 5 Measurement of various electrical parameters; Household and commercial wiring

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.

• Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.

• Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components: • Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

• Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of Ohms law, KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Course Outcomes:

On successful completion of the course the student could be		POs
CO1	Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.	PO1, PO2, PO3
CO2	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.	PO1, PO2, PO3
CO3	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.	PO1, PO2, PO3
CO4	Analyze various characteristics of electrical circuits, electrical machines and measuring instruments.	PO1, PO2, PO3, PO12
CO5	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.	PO1, PO2, PO3, PO12



PART B: ELECTRONICS ENGINEERING LAB

COURSE EDUCATIONAL OBJECTIVES:

- 1 Identify & testing of various electronic components.
- 2 Understand the usage of electronic measuring instruments.
- 3 Evaluate the performance of rectifiers
- 4 Study the characteristics of various electron devices
- 5 Obtain the operation of a digital circuit.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

COURSE OUTCOMES:

On successful completion of the course the student could be		POs
CO1	Identify & testing of various electronic components.	PO1, PO2, PO3,
CO2	Understand the usage of electronic measuring instruments.	PO1, PO2, PO3,
CO3	Evaluate the performance of rectifiers	PO1, PO2, PO3,
CO4	Plot and discuss the characteristics of various electron devices	PO1, PO2, PO3, PO12
CO5	Obtain the operation of a digital circuit.	PO1, PO2, PO3, PO12

REFERENCES:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

I B.Tech. – I /II Semester

23ESC118 IT WORKSHOP LAB (Common to all branches of Engineering)	L	T	P	C
	0	0	2	1

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

List of Experiments:

PC Hardware & Software Installation

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva
5. Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

6. Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
7. Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
8. Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
9. Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.



LaTeX and WORD

10. Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent(FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Usinghelp and resources, rulers, format painter in word.

11. Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeXand Word.

12. Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

13. Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns,Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using helpand resources.

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

15. Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

16. Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

17. Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

18. Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

19. Master Layouts (slide, template, and notes), Types of views (basic, presentation, slideslotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

20. Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

21. Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

22. Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Total Hours: 45

Course Outcomes:

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	PO1
CO2	Demonstrate the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	PO2
CO3	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.	PO3
CO4	Familiarize with parts of MS Office, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	PO4
CO5	Prompt the different types of questions using CHATBOT	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments	PO10
CO9	Continue updating their skill related to MS Office, Internet and Computer in future.	PO12

Text Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition

Reference Books:

1. Introduction to Information Technology, IITL Education Solutions limited, Pearson Education, 2012, 2nd edition
2. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
3. LaTeX Companion, Leslie Lamport, PHI/Pearson.
4. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
5. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan – CISCO Press, Pearson Education, 3rd edition



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Accredited by NBA)

CO-PO Mapping

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

I B.Tech. – II Semester

23CSE121 DATA STRUCTURES LAB (Common to CSE, CSE (AI&ML), CSE (AI) and CSE (DS))	L	T	P	C
	0	0	3	1.5

PRE-REQUISITES: Computer Programming

COURSE OBJECTIVES:

1. To strengthen the ability of the students to identify the problem.
2. To apply the suitable datastructure for the given real-world problem.
3. To understand the knowledge about linear data structure.
4. To understand and analyze the data structure concepts using non-linear data structures.
5. To gain knowledge in practical applications of data structures.

List of Experiments:

1: Array Manipulation

- i) Write a program to reverse an array.
- ii) C Programs to implement the Searching Techniques – Linear & Binary Search
- iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

2: Linked List Implementation

- i) Implement a singly linked list and perform insertion and deletion operations.
- ii) Develop a program to reverse a linked list iteratively and recursively.
- iii) Solve problems involving linked list traversal and manipulation.

3: Linked List Applications

- i) Create a program to detect and remove duplicates from a linked list.
- ii) Implement a linked list to represent polynomials and perform addition.
- iii) Implement a double-ended queue (deque) with essential operations.

4: Double Linked List Implementation

- i) Implement a doubly linked list and perform various operations to understand its properties and applications.
- ii) Implement a circular linked list and perform insertion, deletion, and traversal.

5: Stack Operations

- i) Implement a stack using arrays and linked lists.
- ii) Write a program to evaluate a postfix expression using a stack.
- iii) Implement a program to check for balanced parentheses using a stack.

6: Queue Operations

- i) Implement a queue using arrays and linked lists.
- ii) Develop a program to simulate a simple printer queue system.
- iii) Solve problems involving circular queues.

7: Stack and Queue Applications

- i) Use a stack to evaluate an infix expression and convert it to postfix.
- ii) Create a program to determine whether a given string is a palindrome or not.
- iii) Implement a stack or queue to perform comparison and check for symmetry.



8: Binary Search Tree

- i) Implementing a BST using Linked List.
- ii) Traversing of BST.

9: Hashing

- i) Implement a hash table with collision resolution techniques.
- ii) Write a program to implement a simple cache using hashing.

Total Hours: 45

COURSE OUTCOMES

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms	PO1
CO2	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	PO2
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems	PO3
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.	PO4
CO5	Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to loops, pointers and files, implementing programs in future.	PO12

Textbooks:

- 1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
- 2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

- 1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
- 2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
- 3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
- 4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Accredited by NBA)

Reference Websites:

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

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	-	3	-	-	3	3	3	-	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)**

DEPARTMENT OF SCIENCE & HUMANITIES

I B.Tech I/II sem

23HSM114 NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE L T P C
(Common to All branches of Engineering) 0 0 1 0.5

COURSE EDUCATIONAL OBJECTIVES:

1. To impart discipline, character, and fraternity amongst young citizens
2. To train them to work in teams/groups to enhance their team spirit.
3. To enable the students to acquire leadership qualities.
4. To induce social consciousness among students through various activities.
5. To instill self-confidence and the ideals of selfless service
6. To engage students in responsible and challenging actions for the common good.

COURSE OUTCOMES:

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

1. Understand the importance of discipline, character and service motto.
2. Outline the needs and problems of the community
3. Solve some societal issues by applying acquired knowledge, facts, and techniques
4. Explore human relationships by analyzing social problems
5. Determine to extend their help for the fellow beings and downtrodden people
6. Develop leadership skills and civic responsibilities

UNIT-I: ORIENTATION

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

1. Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
2. Conducting orientations programs for the students –future plans-activities-releasing road map etc.
3. Displaying success stories-motivational biopics- award winning movies on societal issues etc.
4. Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT-II: NATURE & CARE

Activities:

1. Best out of waste competition.
2. Poster and signs making competition to spread environmental awareness.
3. Recycling and environmental pollution article writing competition.
4. Organising Zero-waste day.
5. Digital Environmental awareness activity via various social media platforms.
6. Virtual demonstration of different eco-friendly approaches for sustainable living.
7. Write a summary on any book related to environmental issues.

UNIT-III:COMMUNITY SERVICE

Activities:

1. Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media-authorities-experts-etc.
2. Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
3. Conducting consumer Awareness. Explaining various legal provisions etc.
4. Women Empowerment Programmes - Sexual Abuse, Adolescent Health and Population Education.
5. Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students

EVALUATION GUIDELINES:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva• voce on the subject.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23BSC232

DISCRETE MATHEMATICS & GRAPH THEORY
(Common to CSE, CSM, CAI, CSD)

L T P C
3 0 0 3

PRE-REQUISITES: Engineering Mathematics

COURSE EDUCATIONAL OBJECTIVES:

1. To apply mathematical logic to solve problems
2. To understand the concepts and perform the operations related to sets, relations and functions. To Gain the conceptual background needed and identify structures of algebraic nature.
3. To apply basic counting techniques to solve combinatorial problems.
4. To formulate problems and solve recurrence relations..
5. To Apply Graph Theory in solving computer science problems

UNIT I: MATHEMATICAL LOGIC

(9)

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT 2: SET THEORY

(9)

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT 3: ELEMENTARY COMBINATORICS

(9)

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNIT 4: RECURRENCE RELATIONS

(9)

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

UNIT 5: Graphs

(9)

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - III Semester

23HSM234 UNIVERSAL HUMAN VALUES – UNDERSTANDING L T P C
HARMONY AND ETHICAL HUMAN CONDUCT 2 1 0 3
(Common to All Branches of Engineering)

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

UNIT I: INTRODUCTION TO VALUE EDUCATION (9)

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Sharing about Oneself, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Exploring Human Consciousness, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations, Exploring Natural Acceptance.

UNIT 2: HARMONY IN THE HUMAN BEING (9)

Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, Exploring the difference of Needs of self and body, The body as an Instrument of the self, Understanding Harmony in the self, Exploring Sources of Imagination in the self, Harmony of the self with the body, Programme to ensure self-regulation and Health, Exploring Harmony of self with the body.

UNIT 3: HARMONY IN THE FAMILY AND SOCIETY (9)

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, Exploring the Feeling of Trust, 'Respect' – as the Right Evaluation, Exploring the Feeling of Respect, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order, Exploring Systems to fulfill Human Goal.

UNIT 4: HARMONY IN THE NATURE/EXISTENCE (9)

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Exploring the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Exploring Co-existence in Existence

UNIT 5: IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS (9)

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, Exploring Ethical Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Exploring Humanistic Models in Education, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession, Exploring Steps of Transition towards Universal Human Order.

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	PO6, PO7, PO8, PO9, PO12
CO2	Identify oneself, and one's surroundings (family, society nature)	PO6, PO7, PO8, PO9, PO12
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	PO6, PO7, PO8, PO9, PO12
CO4	Relate human values with human relationship and human society.	PO6, PO7, PO8, PO9, PO12
CO5	Justify the need for universal human values and harmonious existence	PO6, PO7, PO8, PO9, PO12
CO6	Develop as socially and ecologically responsible engineers	PO6, PO7, PO8, PO9, PO12

TEXT BOOKS:

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

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - Pandit Sunder lal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

REFERENCE WEBSITE:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%203->



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Harmony%20in%20the%20Family.pdf

4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDPSI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicteindia.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - III Semester

23CSE231

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

L T P C

3 0 0 3

PRE-REQUISITES: A course on C and Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on advance data structures frequently used in Computer Science domain
2. To develop skills in algorithm design techniques popularly used
3. To understand the use of various data structures in the algorithm design

UNIT I: INTRODUCTION

(9)

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. AVL Trees – Creation, Insertion, Deletion operations and Applications. B-Trees – Creation, Insertion, Deletion operations and Applications.

UNIT 2: HEAP TREES & DIVIDE AND CONQUER

(9)

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications.

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen’s matrix multiplication, Convex Hull.

UNIT 3: GREEDY METHOD & DYNAMIC PROGRAMMING

(9)

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths.

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths – General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem.

UNIT 4: BACKTRACKING & BRANCH AND BOUND

(9)

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem.

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem.

UNIT 5: NP HARD, NP HARD GRAPH PROBLEMS & NP HARD SCHEDULING PROBLEMS

(9)

NP Hard and NP Complete Problems: Basic Concepts, Cook’s theorem

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling.

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Illustrate the working of the advanced tree data structures and their applications	PO1, PO2
CO2	Understand the Graph data structure, traversals and apply them in various contexts.	PO1, PO2, PO3, PO4
CO3	Use various data structures in the design of algorithms	PO1, PO2, PO3, PO4, PO5
CO4	Recommend appropriate data structures based on the problem being solved.	PO1, PO2, PO3, PO4, PO5
CO5	Analyze algorithms with respect to space and time complexities	PO1, PO2, PO3, PO4
CO6	Design new algorithms	PO1, PO2, PO3, PO4, PO5

TEXT BOOKS:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press.
2. Computer Algorithms / C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press.

REFERENCE BOOKS:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures & Programs:, N.Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

REFERENCE WEBSITE:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. <http://peterindia.net/Algorithms.html>
3. Abdul Bari,1. Introduction to Algorithms (youtube.com)

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23CSE232 OBJECT-ORIENTED PROGRAMMING THROUGH JAVA

L T P C
3 0 0 3

PRE-REQUISITES: A course on Advanced Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. To identify Java language components and how they work together in applications.
2. To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3. To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4. To understand how to design applications with threads in Java
5. To understand how to use Java apis for program development

UNIT I: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING (9)

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final.

Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement.

UNIT 2: CLASSES, OBJECTS AND METHODS (9)

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT 3: ARRAYS, INHERITANCE AND INTERFACES (9)

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance,



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT 4: PACKAGES, JAVA LIBRARY, EXCEPTION HANDLING, JAVA I/O AND FILE(9)

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java.

UNIT 5: STRING HANDLING, MULTITHREADED PROGRAMMING, JAVA DATABASE CONNECTIVITY, AND JAVA FX GUI (9)

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Analyze problems, design solutions using OOP principles, and implement them efficiently in Java.	PO1, PO2, PO3, PO4, PO5
CO2	Design and implement classes to model real-world entities, with a focus on attributes, behaviors, and relationships between objects	PO1, PO2, PO3, PO4, PO5
CO3	Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch	PO1, PO2, PO3, PO4, PO5
CO4	Apply Competence in handling exceptions and errors to write robust and fault-tolerant code.	PO1, PO2, PO3, PO4, PO5
CO5	Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX.	PO1, PO2, PO3, PO4, PO5
CO6	Choose appropriate data structure of Java to solve a problem	PO1, PO2, PO3, PO4, PO5



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. JAVA one step ahead, Anitha Seth, B. L. Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

REFERENCE BOOKS:

1. The complete Reference Java, 11th edition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

REFERENCE WEBSITE:

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - III Semester

23CAI231

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

L T P C
3 0 0 3

PRE-REQUISITES:

- Knowledge in Computer Programming.
- A course on "Mathematical Foundations of Computer Science".
- Background in linear algebra, data structures and algorithms, and probability.

COURSE EDUCATIONAL OBJECTIVES:

1. To study the concepts of Artificial Intelligence.
2. To learn the methods of solving problems using Artificial Intelligence.
3. To introduce the concepts of Expert Systems.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.
5. To learn different knowledge representation techniques

UNIT I: INTRODUCTION

(9)

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT 2: SEARCHING

(9)

Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT 3: REPRESENTATION OF KNOWLEDGE

(9)

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Bayes' probabilistic interferences and dempstershafer theory.

UNIT 4: LOGIC CONCEPTS

(9)

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT 5: EXPERT SYSTEMS

(9)

Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Study the concepts of Artificial Intelligence.	PO1, PO2
CO2	learn the methods of solving problems using Artificial Intelligence	PO1, PO2, PO3, PO4, PO5
CO3	Introduce the concepts of Expert Systems.	PO1, PO2, PO3, PO4, PO5
CO4	Understand the applications of AI, namely game playing, theorem proving, and machine learning.	PO1, PO2, PO3, PO4, PO5
CO5	learn different knowledge representation techniques	PO1, PO2, PO3, PO4

TEXT BOOKS:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill

REFERENCE BOOKS:

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning.

REFERENCE WEBSITE:

1. <https://ai.google/>
2. https://swayam.gov.in/nd1_noc19_me71/preview

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23CSE233

**ADVANCED DATA STRUCTURES & ALGORITHM
ANALYSIS LAB
(Common to CSE,CSM,CAI,CSD)**

L T P C

0 0 3 1.5

PRE-REQUISITES: A course on C & Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. Acquire practical skills in constructing and managing Data structures.
2. Apply the popular algorithm design methods in problem-solving scenarios.

LIST OF EXPERIMENTS:

1. Construct an AVL tree for a given set of elements which are stored in a file and implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
 - a) Adjacency Matrix
 - b) Adjacency Lists
5. Write a program for finding the bi-connected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.
13. Real-time case studies / Micro projects.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
C01	Understand the object oriented programming concepts	PO1
C02	Identify and design the software using templates	PO2
C03	Develop solutions for the complex engineering problems using data structure concepts like stack and queue	PO3
C04	Implement the trees and sorting methods for different applications	PO4
C05	Understand and identify the suitable pattern matching algorithm for solving complex problems	PO5
C06	Follow ethical principles in designing and implementation of various data structure algorithms	PO8
C07	Do experiments effectively as an individual and as a member in a group	PO9
C08	Communicate verbally and in written form, the understanding about the experiment	PO10
C09	Continue updating their skill related to OOPs, trees and pattern matching algorithm	PO12



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

REFERENCE WEBSITE:

1. <http://cse01-iiith.vlabs.ac.in/>
2. <http://peterindia.net/Algorithms.html>

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23CSE234 OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB L T P C
(Common to CSE,CSM,CAI,CSD) 0 0 3 1.5

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

COURSE EDUCATIONAL OBJECTIVES:

1. Practice object-oriented programming in the Java programming language
2. implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
3. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
4. Construct Threads, Event Handling, implement packages, Java FX GUI.

LIST OF EXPERIMENTS:

Week – 1:

- a) Write a JAVA program to display default value of all primitive data type of JAVA
- b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Week - 2

- a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c) Write a JAVA program using String Buffer to delete, remove character.

Week - 3

- a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- b) Write a JAVA program implement method overloading.
- c) Write a JAVA program to implement constructor.
- d) Write a JAVA program to implement constructor overloading.

Week - 4

- a) Write a JAVA program to implement Single Inheritance
- b) Write a JAVA program to implement multi level Inheritance
- c) Write a JAVA program for abstract class to find areas of different shapes

Week - 5

- a) Write a JAVA program give example for "super" keyword.
- b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
- c) Write a JAVA program that implements Runtime polymorphism

Week - 6

- a) Write a JAVA program that describes exception handling mechanism
- b) Write a JAVA program Illustrating Multiple catch clauses
 - Write a JAVA program for creation of Java Built-in Exceptions
 - Write a JAVA program for creation of User Defined Exception



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Week - 7

- a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable)
- b) Write a program illustrating is Alive and join ()
- c) Write a Program illustrating Daemon Threads.
- d) Write a JAVA program Producer Consumer Problem

Week – 8

- a) Write a JAVA program that import and use the user defined packages
- b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
- c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Week – 9

- a) Write a java program that connects to a database using JDBC
- b) Write a java program to connect to a database using JDBC and insert values into it.
- c) Write a java program to connect to a database using JDBC and delete values from it.

COURSE OUTCOMES:

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

REFERENCE BOOKS:

- 1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
- 2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.
4. The complete Reference Java, 11th edition, Herbert Schildt, TMH
5. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson.

REFERENCE WEBSITE:

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23CSE235

PYTHON PROGRAMMING
SKILL ENHANCEMENT COURSE
(Common to CSE,CSM,CAI,CSD)

L T P C
0 1 2 2

PRE-REQUISITES: A course on C and Data Structures

COURSE EDUCATIONAL OBJECTIVES:

1. Introduce core programming concepts of Python programming language.
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

UNIT I: PARTS OF PYTHON PROGRAMMING LANGUAGE, CONTROL FLOW STATEMENTS (6)

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

LIST OF EXPERIMENTS:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT 2: FUNCTIONS, STRINGS, LISTS (6)

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement..



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

LIST OF EXPERIMENTS:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
 - i. Addition
 - ii. Insertion
 - iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT 3: DICTIONARIES, TUPLES AND SETS (6)

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

LIST OF EXPERIMENTS:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT 4: FILES, OBJECT-ORIENTED PROGRAMMING (6)

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

LIST OF EXPERIMENTS:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT 5: INTRODUCTION TO DATA SCIENCE (6)

Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

LIST OF EXPERIMENTS:

24. Python program to check whether a JSON string contains complex object or not.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
 - i. Apply head () function to the pandas data frame
 - ii. Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib.

Total Hours: 30

COURSE OUTCOMES:

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

REFERENCE BOOKS:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

REFERENCE WEBSITE:

1. <https://www.coursera.org/learn/python-for-applied-data-science-ai>
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech. - III Semester

23MAC231

ENVIRONMENTAL SCIENCE
(Common to All Branches)

L T P C
2 0 0 2

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To make the students to get awareness on environment.
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
3. To save earth from the inventions by the engineers.

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (6)

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance
– Need for Public Awareness.

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

UNIT 2: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION (6)

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its Conservation: Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT 3: ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT (6)

Environmental Pollution: Definition, Cause, effects and control measures of: a. Air Pollution, b. Water pollution, c. Soil pollution, d. Marine pollution, e. Noise pollution, f. Thermal pollution, g. Nuclear hazards.

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

UNIT 4: SOCIAL ISSUES AND THE ENVIRONMENT (6)

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

UNIT 5: Human Population and the Environment, FIELD WORK (6)

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

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

Total Hours: 30

COURSE OUTCOMES:

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

TEST BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

REFERENCE BOOKS:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B. Tech IV Semester

23BSC242

OPTIMIZATION TECHNIQUES

L T P C
2 0 0 2

COURSE EDUCATIONAL OBJECTIVES:

1. To provide the basic knowledge about Optimization, importance, application areas of in the industry, Linear Programming.
2. To impart different optimization models under typical situations in the business organization like transportation, assignment.
3. To understand the process of sequencing in a typical industry.
4. To describe different game strategies under cut-throat competitive business environment
5. To develop networks of activities of projects and to find out optimal modes of completing projects using network modelling evaluation techniques

UNIT - I

Introduction: Meaning, Nature, Scope & Significance of Optimization - Typical applications. The Linear Programming Problem - Introduction, Formulation of Linear Programming problem, Limitations of L.P.P, Graphical method, Simplex method: Maximization and Minimization model(exclude Duality problems), Big-M method and Two Phase method.

UNIT - II

Transportation Problem: Introduction, Transportation Model, Finding initial basic feasible solutions, Moving towards optimality, Unbalanced Transportation problems, Transportation problems with maximization, Degeneracy.

Assignment Problem - Introduction, Mathematical formulation of the problem, Solution of an Assignment problem, Hungarian Algorithm, Multiple Solution, Unbalanced Assignment problems, Maximization in Assignment Model.

UNIT - III

Sequencing - Job sequencing, Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, n jobs through m machines, Two jobs and m Machines Problems.

UNIT - IV

Game Theory: Concepts, Definitions and Terminology, Two Person Zero Sum Games, Pure Strategy Games (with Saddle Point), Principal of Dominance, Mixed Strategy Games (Game without Saddle Point), Significance of Game Theory in Managerial Application.

UNIT - V

Project Management: Network Analysis - Definition -objectives -Rules for constructing network diagram- Determining Critical Path - Earliest & Latest Times - Floats - Application of CPM and PERT techniques in Project Planning and Control - PERT Vs CPM. (exclude Project Crashing).



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understanding Optimization and Formulation of Linear Programming	PO1,PO2,PO3
CO2	Formulate and Solve Transportation & Assignment Models	PO1,PO2,PO3
CO3	Sequencing of operations and optimizing	PO1,PO2,PO3,PO4
CO4	Discuss the game theory and strategies	PO1,PO2,PO3
CO5	Developing networks of activities and finding optimal mode of projects evaluation.	PO1,PO2,PO3,PO4

TEXT BOOKS:

1. Operations Research / R.Pannerselvam, PHI Publications.
2. Operations Research / S.D.Sharma-Kedarnath
3. Operations Research /A.M.Natarajan, P.Balasubramani,A. Tamilarasi/Pearson Education.
4. Engineering Optimization: Theory and practice / S.S.Rao, New Age International (P) Limited

REFERENCE BOOKS:

1. Quantitative Techniques in Management / ND Vohra, Tata McGraw Hill, 4th Edition, 2011.
2. Introduction to O.R/Hiller &Libermann (TMH).
3. Operations Research: Methods & Problems / Maurice Saseini, ArhurYaspan& Lawrence Friedman. Pearson
4. Quantitative Analysis For Management/ Barry Render, Ralph M. Stair, Jr and Michael E. Hanna/
5. Operations Research / Wagner/ PHI Publications.

REFERENCE WEBSITE:

1. https://onlinecourses.swayam2.ac.in/cec20_ma10/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma23/preview
3. https://onlinecourses.nptel.ac.in/noc19_ma29/preview

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	-	-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	-	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	3	3	3	2		-	-	-	-	-	-	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

II B.Tech. - IV Semester

23BSC243

**PROBABILITY & STATISTICS
(Common to CSE and all CSE allied branches)**

**L T P C
3 0 0 3**

UNIT 1: DESCRIPTIVE STATISTICS (9)

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

UNIT 2: PROBABILITY (9)

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

UNIT 3: PROBABILITY DISTRIBUTIONS (9)

Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.

UNIT 4: ESTIMATION AND TESTING OF HYPOTHESIS, LARGE SAMPLE TESTS (9)

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT 5: SMALL SAMPLE TESTS (9)

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Acquire knowledge in finding the analysis of categorically and various statistical elementary tools.	PO1, PO2, PO3, PO4
CO2	Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.	PO1, PO2, PO3, PO4
CO3	Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.	PO1, PO2, PO3, PO4
CO4	Analyze to test various hypotheses included in theory and types of errors for large samples.	PO1, PO2, PO3, PO4
CO5	Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real-life problems.	PO1, PO2, PO3, PO4

TEXT BOOKS:

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - IV Semester

23ESC232

DIGITAL LOGIC & COMPUTER ORGANIZATION

L T P C
3 0 0 3

PRE-REQUISITES: A Course on basic Electronics

COURSE EDUCATIONAL OBJECTIVES:

1. provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
2. Describe memory hierarchy concepts
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

UNIT I: Data Representation

(9)

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes.

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

UNIT 2: Digital Logic Circuits-II

(9)

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture.

UNIT 3: Computer Arithmetic

(9)

Computer Arithmetic : Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.

UNIT 4: The Memory Organization

(9)

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT 5:

(9)

Input /Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - IV Semester

23CSE241

DATABASE MANGEMENT SYSTEM
(Common to CSE, CSM, CAI, CSD)

L T P C
3 0 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. Discuss the basic Database concepts and the applications, data models and ER Model.
2. Understand the Relational database design principles
3. Master the basics of SQL and construct queries using SQL.
4. Understand the Normalization process in Database Management System.
5. Familiar with the basic issues of transaction processing and concurrency control.

UNIT –1: INTRODUCTION TO DATABASE MANAGEMENT SYSTEM AND ENTITY RELATIONSHIP MODEL (9)

Database system - Characteristics (Database Vs File System) - Database Users - Advantages of Database systems - Database applications - Brief introduction of different Data Models - Concepts of Schema - Instance and data independence - Three tier schema architecture for data independence - Database system structure environment - Centralized and Client Server architecture for the database - Introduction to Entity Relationship Model - Representation of entities - Attributes - Entity set - Relationship - Relationship set - Constraints - Sub classes - super class - Inheritance- Specialization -Generalization using ER Diagrams.

UNIT –2: RELATIONAL MODEL (9)

Introduction to Relational model - Concepts of domain - Attribute - Tuple - Relation importance of null values - Constraints (Domain, Key constraints, integrity constraints) and their importance - Relational Algebra, Relational Calculus - BASIC SQL: Simple Database schema - Data Base Language - types- Table definitions (create, alter), different DML operations (insert, delete, update).

UNIT –3: INTRODUCTION TO STRUCTURED QUERY LANGUAGE (9)

Basic SQL querying (select and project) using where clause arithmetic & logical operations - SQL functions(Date and Time, Numeric, String conversion) - Creating tables with relationship, Implementation of key and integrity constraints - Nested queries, sub queries, grouping, aggregation, ordering - Implementation of different types of Joins, view (updatable and non- updatable) - Relational set operations.

UNIT –4: NORMALIZATION (9)

Purpose of Normalization and schema refinement - Concept of functional dependency - normal forms based on functional dependency - Lossless join and dependency preserving decomposition (1NF, 2NF and 3 NF), concept of surrogate key - Boyce-Codd normal form(BCNF) - MVD - Fourth normal form(4NF) - Fifth Normal Form (5NF).

UNIT –5: TRANSACTION CONCEPT AND INDEXING CONCEPTS (9)

Transaction State - ACID properties - Concurrent Executions - Serializability - Recoverability, Implementation of Isolation - Testing for Serializability - Lock based - Time stamp based optimistic - Concurrency protocols - Deadlocks - Failure Classification - Storage, Recovery and Atomicity - Recovery algorithm - Introduction to Indexing Techniques - B+ Trees, operations on B+ Trees - Hash Based Indexing

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Demonstrate knowledge on Data models and Database Languages and Design Entity Relationship model for a database	PO1, PO3
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries	PO1, PO2
CO3	Analyze and evaluate the database using SQL DML/DDDL	PO1, PO2, PO3, PO5
CO4	Analyze databases using normal forms to provide solutions for real time applications	PO1, PO2
CO5	Understand the properties of transactions in a database system, analyze serializability and indexing techniques.	PO1, PO3, PO4

TEXT BOOKS:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

1. Introduction to Database Systems, 8th edition, C J Date, Pearson.
2. Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

REFERENCE WEBSITE:

1. <https://www.w3schools.in/sql/database-concepts>
2. <https://www.javatpoint.com/dbms-tutorial>
3. <https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/>
4. <https://nptel.ac.in/courses/106/105/106105175/>
5. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

CO-PO MAPPING:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	3	-	3	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	2	3	-	-	-	-	-	-	-	-
CO*	3	3	2.6	3	3	-	-	-	-	-	-	-



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. – IV Semester

23CSM241

MACHINE LEARNING

L T P C
3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Define machine learning and its different types (supervised and unsupervised) and understand their applications.
2. Apply supervised learning algorithms including decision trees and k-nearest neighbors (k-NN).
3. Implement unsupervised learning techniques, such as K-means clustering.

UNIT I: INTRODUCTION TO MACHINE LEARNING (9)

Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.

UNIT 2: NEAREST NEIGHBOUR-BASED MODELS (9)

Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures, K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.

UNIT 3: MODELS BASED ON DECISION TREES (9)

Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias-Variance Trade-off, Random Forests for Classification and Regression.

The Bayes Classifier: Introduction to the Bayes Classifier, Bayes' Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)

UNIT 4: LINEAR DISCRIMINANTS FOR MACHINE LEARNING (9)

Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP.

UNIT 5: CLUSTERING (9)

Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.

Total Hours: 45



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Identify machine learning techniques suitable for a given problem.	PO6, PO7, PO8, PO9, PO12
CO2	Solve real-world problems using various machine learning techniques.	PO6, PO7, PO8, PO9, PO12
CO3	Apply Dimensionality reduction techniques for data preprocessing.	PO6, PO7, PO8, PO9, PO12
CO4	Explain what is learning and why it is essential in the design of intelligent machines.	PO6, PO7, PO8, PO9, PO12
CO5	Evaluate Advanced learning models for language, vision, speech, decision making etc.	PO6, PO7, PO8, PO9, PO12

TEXT BOOKS:

1. "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024

REFERENCE BOOKS:

2. "Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017.
3. "Machine Learning in Action", Peter Harrington, DreamTech, 2012.
4. "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

CO-PO MAPPING:

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



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - IV Semester

23CSE245

DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE, CSM, CAI, CSD)

L	T	P	C
3	0	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers

EXPERIMENTS COVERING THE TOPICS:

1. DDL, DML, DCL commands
2. Queries, nested queries, built-in functions,
3. PL/SQL programming- control structures
4. Procedures, Functions, Cursors, Triggers,
5. Database connectivity- ODBC/JDBC

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, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and 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. Create a 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)



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

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

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT-IN Exceptions, USER defined Exceptions, RAISE_APPLICATION_ERROR.

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

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

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

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

12. Create a table and perform the search operation on table using indexing and non-indexing techniques.

13. Write a Java program that connects to a database using JDBC

14. Write a Java program to connect to a database using JDBC and insert values into it

15. Write a Java program to connect to a database using JDBC and delete values from it

REFERENCE BOOKS:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007
4. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
5. Database Principles Fundamentals of Design Implementation and Management, 10th edition, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REFERENCE WEBSITE:

1. <https://www.scoopworld.in>
2. <https://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php>

COURSE OUTCOMES:

On successful completion of the course the student will be		POs
C01	Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.	PO1
C02	Analyze the database schemas for the different types of database	PO2
C03	Design the databases using SQL DML/DDL Commands	PO3
C04	Design the complex PL/SQL programs for different problems	PO4
C05	Use the procedure, function, trigger and cursor concepts in PL/SQL	PO5
C06	Follow the ethical principles in implementing the programs	PO8
C07	Do experiments effectively as an individual and as a team member in a group.	PO9
C08	Communicate verbally and in written form, the understanding about the experiments.	PO10
C09	Continue updating their skill related to SQL Commands and Queries and implementing programs in future.	PO12

CO PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - IV Semester

23CSE246

FULL STACK DEVELOPMENT – 1
(Skill Enhancement Course)

L T P C
0 1 2 2

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

- CO1: Design Websites.
- CO2: Apply Styling to web pages.
- CO3: Make Web pages interactive.
- CO4: Design Forms for applications.
- CO5: Choose Control Structure based on the logic to be implemented.
- CO6: Understand HTML tags, Attributes and CSS properties

TRADE FOR EXERCISES:

1. LISTS, LINKS AND IMAGES

- a. Write a HTML program, to explain the working of lists.
Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.
- b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.
- c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.
- d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML TABLES, FORMS AND FRAMES

- Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
- Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).
- Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).
- Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame image, second frame paragraph, third frame hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

3. HTML 5 AND CASCADING STYLE SHEETS, TYPES OF CSS

- a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, tags.
- b. Write a HTML program, to embed audio and video into HTML web page.
- c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

4. SELECTOR FORMS

- a. Write a program to apply different types of selector forms
 - Simple selector (element, id, class, group, universal)
 - Combinator selector (descendant, child, adjacent sibling, general sibling)
 - Pseudo-class selector
 - Pseudo-element selector
 - Attribute selector

5. CSS WITH COLOR, BACKGROUND, FONT, TEXT AND CSS BOX MODEL

- a. Write a program to demonstrate the various ways you can reference a color in CSS.
- b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.
- c. Write a program using the following terms related to CSS font and text:
 - i. font-size
 - ii. font-weight
 - iii. font-style
 - iv. text-decoration
 - v. text-transformation
 - vi. text-alignment
- d. Write a program, to explain the importance of CSS Box model using
 - i. Content
 - ii. Border
 - iii. Margin
 - iv. Padding

6. APPLYING JAVASCRIPT - INTERNAL AND EXTERNAL, I/O, TYPE CONVERSION

- a. Write a program to embed internal and external JavaScript in a web page.
- b. Write a program to explain the different ways for displaying output.
- c. Write a program to explain the different ways for taking input.
- d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. JAVASCRIPT PRE-DEFINED AND USER-DEFINED OBJECTS

- a. Write a program using document object properties and methods.
- b. Write a program using window object properties and methods.
- c. Write a program using array object properties and methods.
- d. Write a program using math object properties and methods.
- e. Write a program using string object properties and methods.
- f. Write a program using regex object properties and methods.
- g. Write a program using date object properties and methods.
- h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. JAVASCRIPT CONDITIONAL STATEMENTS AND LOOPS

- a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
- b. Write a program to display week days using switch case.
- c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
- d. Write a program to print data in object using for-in, for-each and for-of loops
- e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e., $13 + 53 + 33 = 153$]
- f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

100's, 1-50's, 1- 10's, 1-2's & 1-1's)

9. JAVASCRIPT FUNCTIONS AND EVENTS

- a. Design a appropriate function should be called to display
 - Factorial of that number
 - Fibonacci series up to that number
 - Prime numbers up to that number
 - Is it palindrome or not
- b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
 - 11. Factorial of that number
 - 12. Fibonacci series up to that number
 - 13. Prime numbers up to that number
 - 14. Is it palindrome or not
- c. Write a program to validate the following fields in a registration page
 - i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
 - ii. Mobile (only numbers and length 10 digits)
 - iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

TEXT BOOKS:

- 1. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
- 2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
- 3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

REFERENCE WEBSITE:

- 1. <https://www.w3schools.com/html>
- 2. <https://www.w3schools.com/css>
- 3. <https://www.w3schools.com/js/>
- 4. <https://www.w3schools.com/nodejs>
- 5. <https://www.w3schools.com/typescript>

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
C01	Demonstrate the knowledge on different tools used in carpentry, fitting, sheet metal, house wiring and plumbing sections and also basic machining process	PO1
C02	Analyze the basic pipeline connection using different joints	PO2
C03	Design and develop simple components by using different materials includes wood, GI sheet and MS plates	PO3
C04	Apply basic electrical engineering tools on the house wiring practice	PO5
C05	Follow the ethical principles in while doing the exercises.	PO8
C06	Do the exercises effectively as an individual and as a team member in a group	PO9
C07	Communicate verbally among team members and in written form, the understanding about the trade exercises.	PO10
C08	Continue updating their skill related to trades.	PO12



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CO PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	-	3	-	-	-	-	-	-	-
C05	-	-	-	-	-	-	-	3	-	-	-	-
C06	-	-	-	-	-	-	-	-	3	-	-	-
C07	-	-	-	-	-	-	-	-	-	3	-	-
C08	-	-	-	-	-	-	-	-	-	-	-	3
CO	3	3	3	-	3	-	-	3	3	3	-	3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

II B.Tech. - IV Semester

23CSM243

MACHINE LEARNING LAB

L T P C
0 0 3 1.5

PRE-REQUISITES: A course on Python Programming

COURSE EDUCATIONAL OBJECTIVES:

1. To learn about computing central tendency measures and Data preprocessing techniques
2. To learn about classification and regression algorithms
3. To apply different clustering algorithms for a problem.

Software Required for ML: Python/R/Weka

List of Experiments

Lab should cover the concepts studied in the course work, sample list of Experiments:

1. Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation.
2. Apply the following Pre-processing techniques for a given dataset.
 - a. Attribute selection
 - b. Handling Missing Values
 - c. Discretization
 - d. Elimination of Outliers
3. Apply KNN algorithm for classification and regression
4. Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results
5. Demonstrate decision tree algorithm for a regression problem
6. Apply Random Forest algorithm for classification and regression
7. Demonstrate Naïve Bayes Classification algorithm.
8. Apply Support Vector algorithm for classification
9. Demonstrate simple linear regression algorithm for a regression problem
10. Apply Logistic regression algorithm for a classification problem
11. Demonstrate Multi-layer Perceptron algorithm for a classification problem
12. Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K
13. Demonstrate the use of Fuzzy C-Means Clustering
14. Demonstrate the use of Expectation Maximization based clustering algorithm.
15. Real-time case studies / Micro projects.



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REFERENCE BOOKS:

1. Python Machine Learning Work book for beginners, AI Publishing, 2020.
2. Anuradha Srinivasaraghavan and Vincy Joseph, "Machine Learning", Wiley Publisher, 2019.
3. SaikatDutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", Pearson, 2019.
4. Alpaydin Ethem, "Introduction to Machine Learning", 3rd Edition, PHI learning private limited, 2019.

REFERENCE WEBSITE:

1. Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2. Machine Learning | Coursera

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the python libraries.	PO1
CO2	Analyze the use of data sets in implementing ML algorithms	PO2
CO3	Understand the different searching algorithms for solving problems, Analyze and identify the problem solving techniques.	PO3
CO4	Identify and implement appropriate unsupervised learning algorithm for solving complex problems.	PO4
CO5	Identify the appropriate tools and data sets for real-time implementation.	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments	PO10
CO9	Continue update skill related to Python and Weka Tool and implementing programs in future	PO12

CO- PO MAPPING:

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



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

II B. Tech IV Semester

23ESC241

DESIGN THINKING & INNOVATION

**L T P C
2 0 0 2**

COURSE EDUCATIONAL OBJECTIVES:

1. The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation.
2. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

UNIT – I INTRODUCTION TO DESIGN THINKING

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT – II DESIGN THINKING PROCESS

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III INNOVATION

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV PRODUCT DESIGN

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design

UNIT – V DESIGN THINKING IN BUSINESS PROCESSES

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining. Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Define the concepts related to design thinking. (L1, L2)	PO1,PO2, PO3
CO2	Explain the fundamentals of Design Thinking and innovation (L1, L2)	PO1,PO2, PO3
CO3	Apply the design thinking techniques for solving problems in various sectors. (L3)	PO1,PO2, PO3
CO4	Analyse to work in a multidisciplinary environment (L4)	PO1,PO2, PO3
CO5	Evaluate the value of creativity (L5)	PO1,PO2, PO3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXTBOOKS:

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCE BOOKS:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013.

REFERENCE WEBSITE:

<https://nptel.ac.in/courses/110/106/110106124/>
<https://nptel.ac.in/courses/109/104/109104109/>
https://swayam.gov.in/nd1_noc19_mg60/preview

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	3	-	-	-	-	-	-	-	-	-
CO.2	3	2	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	3		-	-	-	-	-	-	-	-
CO.4	3	2	3		-	-	-	-	-	-	-	-
CO.5	3	2	3		-	-	-	-	-	-	-	-
CO*	3	2	3			-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

**COURSE CODE
23CAI351T**

CLOUD COMPUTING FOR AI

L	T	P	C
3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

- To introduce the concepts, models, and services of cloud computing and its role in AI.
- To explore the architecture and deployment of AI applications on cloud platforms.
- To equip students with skills in using cloud-based tools and services for AI/ML workloads.
- To understand data storage, processing, and security in cloud for AI tasks.
- To apply cloud computing principles to real-world AI-based solutions.

UNIT I: INTRODUCTION TO CLOUD COMPUTING AND AI INTEGRATION (9)

Basics of Cloud Computing: Characteristics, Models, and Services, Cloud Service Models: IaaS, PaaS, SaaS, Deployment Models: Public, Private, Hybrid, Community, AI and Cloud Convergence: Benefits and Challenges, Use Cases of AI in Cloud: NLP, Vision, Analytics, Overview of Cloud Providers for AI: AWS, Azure, GCP.

UNIT II: STORAGE, COMPUTING, AND DATA PROCESSING IN THE CLOUD (9)

Cloud Storage Services: S3, Blob, BigQuery, Virtualization and Elastic Computing, Distributed Computing with Hadoop and Spark, Data Ingestion and Processing Pipelines, Data Lakes and Warehousing in the Cloud, Cost Optimization for Storage and Compute Resources.

UNIT III: CLOUD-BASED MACHINE LEARNING AND DEEP LEARNING (9)

ML Services on AWS (SageMaker), Azure ML, GCP Vertex AI, Training and Deploying Models on Cloud, AutoML and Custom ML Model Workflows, GPUs/TPUs for Model Training, Experiment Tracking and Model Evaluation, Integration of Notebooks (Jupyter, Colab) with Cloud Storage.

UNIT -4: ADVANCED CLOUD CONCEPTS FOR AI APPLICATIONS (9)

Containers and Docker for AI Applications, Kubernetes and Cloud-native AI Workflows, Serverless Computing: AWS Lambda, Azure Functions, CI/CD Pipelines for AI Models in Cloud, Scaling AI Applications using Load Balancers and Auto-Scaling. Monitoring and Logging in Cloud for AI Workflows.

UNIT -5: SECURITY, ETHICS, AND CASE STUDIES IN CLOUD AI (9)

Security and Privacy in Cloud-based AI, Identity and Access Management (IAM) in Cloud, Cost Management and Billing for AI Services, Ethical Issues and Fairness in Cloud AI, Case Study: AI in Healthcare Cloud Solutions, Case Study: Real-Time Analytics in Financial Cloud Services.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23CAI352T	COMPUTER VISION AND IMAGE PROCESSING	L 3	T 0	P 0	C 3
---------------------------------	---	---------------	---------------	---------------	---------------

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. Introduce fundamental concepts of image processing and computer vision.
2. Develop proficiency in applying algorithms for image analysis and interpretation.
3. Explore techniques for feature extraction, object recognition, and scene understanding.
4. Understand the integration of machine learning methods in computer vision applications.

UNIT –1: Introduction to Computer Vision and Image Processing (9)

Overview of Computer Vision and Image Processing: Definitions and scope, Historical development and applications, Image Formation and Representation: Image acquisition methods, Sampling and quantization, Color spaces and models, Fundamentals of Image Processing: Point operations (brightness and contrast adjustments), Histogram processing, Spatial filtering techniques Fourier Transform and Frequency Domain Processing: Discrete Fourier Transform (DFT), Filtering in the frequency domain, Image restoration concept.

UNIT –2: Image Analysis Techniques (9)

Edge Detection and Feature Extraction: Gradient operators (Sobel, Prewitt), Canny edge detector, Corner and interest point detection, Image Segmentation: Thresholding methods, Region-based segmentation, Clustering techniques (K-means, Mean-Shift), Morphological Image Processing: Erosion and dilation, Opening and closing operations, Applications in shape analysis, Texture Analysis, Statistical methods (co-occurrence matrices), Transform-based methods (Gabor filters), Applications in pattern recognition

UNIT –3: 3D Vision and Motion Analysis (9)

Stereo Vision: Epipolar geometry, Disparity mapping, Depth estimation techniques, Structure from Motion (SfM): Feature tracking across frames, 3D reconstruction from motion, Applications in scene understanding, Optical Flow and Motion Analysis: Lucas-Kanade method, Horn-Schunck method, Motion segmentation, Camera Calibration and 3D Reconstruction: Intrinsic and extrinsic parameters, Calibration techniques, 3D point cloud generation

UNIT –4: Object Recognition and Machine Learning in Vision (9)

Feature Descriptors and Matching: Scale-Invariant Feature Transform (SIFT), Speeded-Up Robust Features (SURF), Feature matching algorithms, Object Detection and Recognition: Template matching Deformable part models, Convolutional Neural Networks (CNNs), Introduction to Machine Learning for Vision: Supervised and unsupervised learning, Support Vector Machines (SVMs), Decision trees and random forests, Deep Learning Architectures: Autoencoders, Recurrent Neural Networks (RNNs), Generative Adversarial Networks (GANs)

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

UNIT –5 : Applications and Advanced Topics

(9)

Image Compression: Lossy and lossless compression techniques, Standards (e.g., JPEG, PNG), Morphological Image Processing: Dilation, erosion, opening, and closing operations. Applications in shape analysis, Case Studies: Face recognition systems., Automated visual inspection, Medical image analysis.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand image formation, representation, and apply basic image processing and frequency domain techniques for image enhancement and restoration.	PO1,PO2
CO2	Apply edge detection, segmentation, morphological, and texture analysis techniques for extracting features from images.	PO1,PO3
CO3	Analyze 3D vision and motion using techniques like stereo vision, optical flow, and camera calibration for scene understanding and depth estimation.	PO1,PO2,PO4
CO4	Evaluate object recognition approaches and machine learning models including traditional and deep learning techniques used in computer vision.	PO1,PO2,PO3, PO4
CO5	Implement advanced computer vision applications such as image compression, face recognition, and medical image analysis using case studies.	PO1,PO2,PO4, PO5

REFERENCE BOOKS:

1. Forsyth, D. A., & Ponce, J. (2002). Computer Vision: A Modern Approach. Prentice Hall.
2. Shapiro, L. G., & Stockman, G. C. (2001). Computer Vision. Prentice Hall.

TEXT BOOKS:

1. Gonzalez, R. C., & Woods, R. E. (2008). Digital Image Processing (3rd ed.). Pearson Prentice Hall. Stony Brook University
2. Szeliski, R. (2010). Computer Vision: Algorithms and Applications. Springer.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	BIG DATA ANALYTICS & AI APPLICATIONS	L	T	P	C
23CSM351T	(PROFESSIONAL CORE)	3	0	0	3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

- To introduce the fundamentals of big data and its role in AI-driven applications.
- To explore big data tools and technologies such as Hadoop, Spark, and NoSQL databases.
- To enable students to build scalable AI pipelines for data analytics.
- To apply AI/ML algorithms for real-time and batch processing environments.
- To demonstrate use cases of big data in domains like healthcare, finance, and IoT using AI.

UNIT I: INTRODUCTION TO BIG DATA AND ANALYTICS ECOSYSTEM (9)

Definition and Characteristics of Big Data – Volume, Velocity, Variety, Veracity, Value, Types of Analytics: Descriptive, Diagnostic, Predictive, Prescriptive, Big Data Challenges and Opportunities, Hadoop Ecosystem Overview: HDFS, MapReduce, YARN, NoSQL Databases: Key-Value, Columnar, Document, Graph Models, Data Lake vs. Data Warehouse.

UNIT II: BIG DATA TOOLS AND FRAMEWORKS (9)

Apache Spark Architecture and RDDs, Spark SQL, DataFrames, and Datasets, Spark Streaming for Real-Time Analytics, Kafka for Data Ingestion and Message Queues, Hive, Pig, and Impala for Big Data Querying, Comparative Analysis of Hadoop vs. Spark.

UNIT III: MACHINE LEARNING ON BIG DATA (9)

Introduction to MLlib and Scikit-learn, Data Preprocessing for Big Data ML Pipelines, Supervised Learning: Classification and Regression on Large Datasets, Unsupervised Learning: Clustering and Dimensionality Reduction, Model Evaluation and Validation Techniques, Distributed Training and Optimization Techniques.

UNIT IV: AI APPLICATIONS ON BIG DATA (9)

Predictive Maintenance using Big Data & AI, Fraud Detection in Banking with Machine Learning, AI in Healthcare: Diagnosis, Genomics, Patient Monitoring, Retail and E-commerce Analytics, AI for Smart Cities and IoT Sensor Data Analysis, Evaluation of Real-Time AI Applications on Streaming Data.

UNIT V: ADVANCED TOPICS AND CASE STUDIES (9)

Deep Learning on Big Data using TensorFlow on Spark, Explainable AI (XAI) in Big Data Environments, Ethical Issues and Data Governance in Big Data AI, Edge Computing and AI for Low Latency Applications, Case Study 1: AI-Powered Big Data in Healthcare, Case Study 2: Big Data AI Solution in Smart Manufacturing.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23ESC351T	INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS	L 3	T 0	P 0	C 3
--	--	----------------------	----------------------	----------------------	----------------------

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

- Introduce fundamental quantum concepts like superposition and entanglement.
- Understand theoretical structure of qubits and quantum information.
- Explore conceptual challenges in building quantum computers.
- Explain principles of quantum communication and computing.
- Examine real-world applications and the future of quantum technologies.

UNIT 1: INTRODUCTION TO QUANTUM THEORY AND TECHNOLOGIES (9)

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, Why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China.

UNIT 2: THEORETICAL STRUCTURE OF QUANTUM INFORMATION SYSTEMS (9)

What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (nonengineering view), Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role.

UNIT 3: BUILDING A QUANTUM COMPUTER – THEORETICAL CHALLENGES AND REQUIREMENTS (9)

What is required to build a quantum computer (conceptual overview)?, Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers: Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison), Superconducting circuits, Trapped ions, Photonics, Vision vs reality: what's working and what remains elusive, The role of quantum software in managing theoretical complexities.

UNIT 4: QUANTUM COMMUNICATION AND COMPUTING – THEORETICAL PERSPECTIVE (9)

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD), Role of Entanglement in Communication, The Idea of the Quantum Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once), Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential.

UNIT 5: APPLICATIONS, USE CASES, AND THE QUANTUM FUTURE (9)

Real-world application domains: Healthcare (drug discovery), Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, PsiQuantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to	Pos
CO1 Describe the structure, principles, and functioning of quantum systems and explain basic quantum concepts such as qubits, superposition, entanglement, and quantum measurement.	PO1,PO2
CO2 Explain and analyze quantum hardware architectures, quantum gates, circuit models, \and quantum error sources including decoherence and noise.	PO1,PO3
CO3 Construct, simulate, and demonstrate basic quantum circuits and apply fundamental quantum algorithms such as Deutsch–Jozsa, Grover’s search, and QFT.	PO1,PO2,PO4
CO4 Identify and describe quantum communication concepts including QKD, quantum channels, teleportation, and quantum cryptographic protocols.	PO1,PO2,PO3, PO4
CO5 Analyze real-time applications of quantum technologies in computing, communication, optimization, AI, and evaluate future trends, challenges, and societal impacts.	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019.

REFERENCE BOOKS:

1. David McMahon, Quantum Computing Explained, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007.
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.
4. Alastair I.M. Rae, Quantum Physics: A Beginner's Guide, Oneworld Publications, Revised Edition, 2005.
5. Eleanor G. Rieffel, Wolfgang H. Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
6. Leonard Susskind, Art Friedman, Quantum Mechanics: The Theoretical Minimum, Basic Books, 2014.
7. Bruce Rosenblum, Fred Kuttner, Quantum Enigma: Physics Encounters Consciousness, Oxford University Press, 2nd Edition, 2011.
8. Giuliano Benenti, Giulio Casati, Giuliano Strini, Principles of Quantum Computation and Information, Volume I: Basic Concepts, World Scientific Publishing, 2004.
9. K.B. Whaley et al., Quantum Technologies and Industrial Applications: European

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

Roadmap and Strategy Document, Quantum Flagship, European Commission, 2020.

10. Department of Science & Technology (DST), Government of India, National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers, MeitY/DST Publications, 2020 onward.

REFERENCE WEBSITE:

1. IBM Quantum Experience and Qiskit Tutorials
2. Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
3. edX – The Quantum Internet and Quantum Computers
4. YouTube – Quantum Computing for the Determined by Michael Nielsen
5. Qiskit Textbook – IBM Quantum

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23CAI356L	COMPUTER VISION AND NATURAL LANGUAGE PROCESSING LAB	L 0	T 0	P 3	C 1.5
--	--	----------------------	----------------------	----------------------	------------------------

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

- To provide hands-on experience in implementing image processing and computer vision algorithms.
- To familiarize students with natural language processing techniques using Python libraries.
- To enable the integration of CV and NLP for building intelligent applications.

LIST OF EXPERIMENTS:

1. Load and display an image using OpenCV and perform basic operations like resizing, cropping, and rotation.
2. Apply edge detection (Sobel, Canny) and thresholding techniques on grayscale and color images.
3. Implement image filtering operations: Gaussian, Median, and Bilateral filters.
4. Perform object detection using contour detection and bounding boxes.
5. Detect faces using Haar Cascade or DNN-based pre-trained models in OpenCV.
6. Implement color-based object tracking using HSV space and CamShift algorithm.
7. Preprocess text data (tokenization, stopword removal, stemming, lemmatization) using NLTK/spaCy.
8. Implement Part-of-Speech (POS) tagging and Named Entity Recognition (NER) using spaCy.
9. Build a simple sentiment analysis classifier using bag-of-words or TF-IDF and Naïve Bayes.
10. Perform topic modeling using Latent Dirichlet Allocation (LDA).
11. Extract text from an image using Optical Character Recognition (OCR) with Tesseract and perform text summarization.
12. Final Mini Project: Integrate CV and NLP (e.g., Read text from signboards or documents and translate/summarize it).

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Load and perform basic image operations using OpenCV (resizing, cropping, rotation).	PO1
CO2	Apply edge detection and thresholding techniques on images.	PO2
CO3	Implement image filtering techniques such as Gaussian, Median, and Bilateral filters.	PO3
CO4	Perform object detection using contour detection and bounding boxes	PO4

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

C05	Detect faces using Haar Cascade and DNN-based models in OpenCV	PO5
C06	Track objects using HSV color space and CamShift algorithm.	PO8
C07	Preprocess text data using NLP techniques such as tokenization and lemmatization	PO9
C08	Implement POS tagging and Named Entity Recognition using spaCy.	PO10
C09	Develop NLP models for sentiment analysis, topic modeling, OCR, and integrated CV–NLP applications	PO12

TEXT BOOKS:

1. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press.
2. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, O'Reilly.
3. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer.

REFERENCE BOOKS:

1. Adrian Rosebrock, Practical Python and OpenCV (PyImageSearch).
2. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press.
3. Bishop C. M., Pattern Recognition and Machine Learning, Springer.

ONLINE LEARNING RESOURCES:

1. <https://opencv.org>
2. <https://www.tensorflow.org/tutorials>
3. <https://www.kaggle.com/learn/intro-to-machine-learning>
4. <https://www.pyimagesearch.com>
5. NPTEL Course on Deep Learning

CO- PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23CSM352L	BIG DATA & CLOUD COMPUTING LAB (PROFESSIONAL CORE)	L	T	P	C
		-	-	3	1.5

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

- To provide hands-on experience in working with big data tools and cloud computing environments.
- To equip students with practical skills in data ingestion, transformation, analysis, and visualization using Hadoop and Spark ecosystems.
- To enable deployment and management of cloud services using AWS, Azure, or GCP.
- To expose students to cloud-native storage, computing, and container orchestration techniques.
- To integrate big data workflows with cloud infrastructure for scalable, distributed data processing

LIST OF LAB EXPERIMENTS:

1. Installation and Configuration of Hadoop Cluster (Single Node & Multi-node) Hadoop HDFS setup, NameNode & DataNode configuration.
2. Working with HDFS: File Operations Upload, read, delete, and replicate files in HDFS.
3. MapReduce Programming Basics Word count, sorting, and filtering examples in Java/Python.
4. Apache Hive & Pig for Querying Large Datasets Creation of tables, data loading, and running queries.
5. Apache Spark Basics: RDDs and DataFrames Implement Spark transformations and actions.
6. Data Preprocessing and Machine Learning using PySpark MLlib Classification or regression using MLlib pipelines.
7. Introduction to Cloud Computing and AWS/Azure/GCP Console Creating virtual machines, basic compute and storage services
8. Cloud Storage and Database Services Using S3 (AWS), Blob (Azure), or GCP buckets and Cloud SQL/NoSQL
9. Deploying Big Data Workloads on Cloud (EMR, HDInsight, Dataproc) Running Hadoop/Spark jobs in cloud-managed services
10. Cloud Function/Serverless Deployment
11. Building and deploying a serverless function (e.g., AWS Lambda)
12. Containerization with Docker
13. Building, running, and managing Docker containers Orchestration with Kubernetes in the Cloud Deploy and manage a containerized application using GKE/EKS/AKS.

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Set up Hadoop (single-node, multi-node) and configure HDFS for distributed storage.	PO1
CO2	Perform file operations in HDFS (upload, read, delete, replicate).	PO2
CO3	Implement MapReduce jobs in Java/Python for word count, sorting, and filtering.	PO3
CO4	Create VMs and use basic compute and storage services in cloud environments.	PO5
CO5	Follow the ethical principles in while doing the exercises.	PO8
CO6	Do the exercises effectively as an individual and as a team member in a group	PO9
CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	PO10
CO8	Continue updating their skill related to trades.	PO12

TEXT BOOKS:

1. Tom White, Hadoop: The Definitive Guide, O'Reilly Media.
2. Rajkumar Buyya et al., Mastering Cloud Computing, McGraw-Hill Education.
3. Holden Karau et al., Learning Spark: Lightning-Fast Big Data Analysis, O'Reilly Media.

REFERENCE BOOKS:

1. Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packt Publishing.
2. Benjamin Bengfort, Data Analytics with Hadoop, O'Reilly.
3. Srinivasan & J.Shrinivasan, Cloud Computing – A Hands-on Approach, Wiley India.

ONLINE COURSES:

1. Big Data Specialization – Coursera (University of California San Diego)
2. Cloud Computing Basics – edX (LearnQuest)
3. Data Engineering with Google Cloud – Coursera (Google)

CO-PO MAPPING:

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

III B.Tech. - I Semester

**COURSE CODE
23CSE356L**

**FULL STACK DEVELOPMENT II
(SKILL ORIENTED COURSE)**

**L T P C
0 0 3 1.5**

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

The main objectives of the course are to

- Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages
- Building robust & responsive User Interfaces using popular JavaScript library `_React.js_`. Building robust backend APIs using `_Express.js_`
- Establishing the connection between frontend (React) Use interfaces and bac

LIST OF EXPERIMENTS:

1. Introduction to Modern JavaScript and DOM

- a) Write a JavaScript program to link JavaScript file with the HTML page
- b) Write a JavaScript program to select the elements in HTML page using selectors
- c) Write a JavaScript program to implement the event listeners
- d) Write a JavaScript program to handle the click events for the HTML button elements
- e) Write a JavaScript program to With three types of functions
 - i. Function declaration
 - ii. Function definition
 - iii. Arrow functions

2. Basics of React. Js

- a) Write a React program to implement a counter button using react class components
- b) Write a React program to implement a counter button using react functional components
- c) Write a React program to handle the button click events in functional component
- d) Write a React program to conditionally render a component in the browser
- e) Write a React program to display text using String literals

3. Important concepts of React. js

- a) Write a React program to implement a counter button using React use State hook
- b) Write a React program to fetch the data from an API using React use Effect hook
- c) Write a React program with two react components sharing data using Props.
- d) Write a React program to implement the forms in react
- e) Write a React program to implement the iterative rendering using `map()` function.

4. Introduction to Node. js and Express. js

- a) Write a program to implement the `_hello world_` message in the route through the browser using Express
- b) Write a program to develop a small website with multiple routes using Express. Js
- c) Write a program to print the `_hello world_` in the browser console using Express. Js
- d) Write a program to implement the CRUD operations using Express. Js
- e) Write a program to establish the connection between API and Database using Express – My SQL driver

5. Introduction to My SQL

- a) Write a program to create a Database and table inside that database using My SQL Command line client
- b) Write a My SQL queries to create table, and insert the data, update the data in the table
- c) Write a My SQL queries to implement the subqueries in the My SQL command line client
- d) Write a My SQL program to create the script files in the My SQL workbench
- e) Write a My SQL program to create a database directory in Project and initialize a database. sql file to integrate the database into API

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Demonstrate knowledge on web page design elements	PO1
CO2	Analyze user requirements to develop web applications.	PO2
CO3	Design client-server applications using web technologies.	PO3
CO4	Manually Test the functionality of the web application	PO4
CO5	select appropriate design tools and procedure to implement web applications	PO5
CO6	Follow ethical principles in designing, and implementing various Technologies.	PO8
CO7	Do experiments effectively as an individual and as a member in a group.	PO9
CO8	Communicate verbally and in written form, the understandings about the experiments	PO10
CO9	Continue updating their skill related to various web technologies for implementation of various web applications during their life time	PO12

TEXTBOOKS:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Dockett
Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
4. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by- Step Guide to Creating Dynamic Websites by Robin Nixon
5. AZAT MARDAN, Full Stack Java Script: Learn Back bone. js, Node.jsand Mongo DB.2015

REFERENCE BOOKS:

1. Full-Stack JavaScript Development by Eric Bush.
2. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
3. Tomasz Dyl , Kamil Przeorski , Maciej Czarnecki, Mastering Full Stack React Web Development 2017

ONLINE LEARNING RESOURCES:

1. <https://ict.iitk.ac.in/product/full-stack-developer-html5- css3- js-bootstrap-php-4/>
2. <https://www.w3schools.com/html>
3. <https://www.w3schools.com/css>
4. <https://www.w3schools.com/js/>
5. <https://www.w3schools.com/nodejs>
6. <https://www.w3schools.com/typescript>

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

CO PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	3	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	3	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO	3	3	3	3	3	-	-	3	3	3	-	3

III B.Tech. - I Semester

**COURSE CODE
23MAC351U**

TECHNICAL PAPER WRITING & IPR

**L T P C
2 0 0 0**

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES:

1. To enable the students to practice the basic skills of research paper writing
2. To make the students understand the importance of IP and to educate the month basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help the min knowing the significance of real life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights & Trade Marks

UNIT-I:

(9)

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings- discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

UNIT-II:

(9)

Technical Research Paper Writing: Abstract – Objectives – Limitations Review of Literature- Problems and Framing Research Questions- Synopsis.

UNIT-III:

(9)

Process of research publication mechanism –types of journals – indexing - seminars- conferences - Proofreading– plagiarism style seminar & conference paper writing Methodology-discussion- results- citation rules.

UNIT-IV:

(9)

Intro Intellectual property - Introduction, types of intellectual property, International organizations, agencies and ties, importance of intellectual property right side Marks- Purpose and function of trademarks, acquisition of trademarks rights, protectable matter, selecting and uniting trade mark, trade mark registration processes.

UNIT-V

(9)

Law of copy rights- Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents -Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, intellectual property audits.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:		POS
CO1	Identify key secondary literature related to their proposed technical paper writing.	PO1,PO2
CO2	Explain various principles and styles in technical writing.	PO5
CO3	Use the acquired knowledge in writing are search/technical paper.	PO2,PO5
CO4	Analyze rights and responsibilities of holder of Patent, Copy right, trademark, International Trademark etc.	PO6
CO5	Evaluate different forms of IPR available at national & international level.	PO4
CO6	Develop skill of making search of various forms of IPR by using modern tools and techniques.	PO4

TEXTBOOKS:

1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage LearningIndia,2013
2. Meenakshi Raman, Sangeeta Sharma. Technical Communication: Principles and practices. Oxford.

REFERENCE BOOKS:

1. R. Myneni, Law of Intellectual Property,9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli ,Intellectual Property Rights Tata Mcg raw Hill, 2001
3. P. Naryan, Intellectual PropertyLaw,3rdEd, EasternLawHouse,2007.
4. Adrian Wall work. English for Writing Research Papers Second Edition. Springer Cham Heidelberg New York ,2016
5. Dan Jones, Sam Drag ga, Technical Writing Style

ONLINE RESOURCES:

1. <https://theconceptwriters.com.pk/principles-of-technical-writing/>
2. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
3. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
4. <https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/>
5. <https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf>
6. <https://lawbhoomi.com/intellectual-property-rights-notes/>
7. <https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf>

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	1
CO2	3	3	2	3	2	-	-	-	-	-	-	2
CO3	3	3	3	3	2	1	-	-	-	-	-	2
CO4	3	3	2	2	1	-	-	-	-	-	-	1
CO5	3	3	3	3	2	-	-	-	-	-	-	2

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23CAI354A	COMPUTATIONAL INTELLIGENCE (Professional Elective-I)	L T P C 3 0 0 3
--	---	----------------------------------

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

- Understand the concepts and foundations of computational intelligence.
- Study neural networks, fuzzy logic systems, and evolutionary algorithms.
- Explore hybrid systems and their applications.
- Apply computational intelligence techniques to real-world problem-solving.
- Analyze the effectiveness of various computational intelligence approaches.

UNIT I: INTRODUCTION TO COMPUTATIONAL INTELLIGENCE AND ARTIFICIAL NEURAL NETWORKS (9)

Definition and Scope of Computational Intelligence (CI), Components of CI: Neural Networks, Fuzzy Logic, Evolutionary Computation, Biological Neuron vs. Artificial Neuron, McCulloch-Pitts Model, Perceptron, Adaline and Madaline, Multilayer Feedforward Networks, Backpropagation Algorithm, Applications of ANN in Pattern Recognition and Classification.

UNIT II: FUZZY LOGIC AND FUZZY SYSTEMS (9)

Introduction to Fuzzy Logic and Fuzzy Sets, Membership Functions, Fuzzy Set Operations, Fuzzy Rules and Inference Systems, Fuzzification and Defuzzification, Fuzzy Control Systems, Fuzzy Reasoning and Approximate Reasoning

UNIT III: EVOLUTIONARY COMPUTATION TECHNIQUES (9)

Basics of Evolutionary Algorithms (EA), Genetic Algorithms (GA): Operators, Encoding, Fitness Function, Selection, Crossover and Mutation, Convergence Criteria, Genetic Programming (GP), Differential Evolution (DE), Applications of GA and GP

UNIT IV: SWARM INTELLIGENCE AND HYBRID SYSTEMS (9)

Swarm Intelligence: Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), Behavior of Swarms and Collective Intelligence, Comparison of Evolutionary Algorithms and Swarm Techniques, Hybrid Systems: Neuro-Fuzzy, Fuzzy-GA, ANN-GA Systems, Case Studies in Hybrid Systems

UNIT V: APPLICATIONS OF COMPUTATIONAL INTELLIGENCE (9)

CI in Image and Signal Processing, CI for Optimization Problems and Robotics, CI in Biomedical Engineering and Finance, Intelligent Agents and Decision-Making Systems, Real-time Applications and Emerging Trends in CI.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Describe and differentiate neural networks, fuzzy logic, and evolutionary computation. (Understand)	PO1,PO2
CO2	Apply neural and fuzzy systems for real-time decision-making. (Apply)	PO1, PO3
CO3	Analyze complex problems using soft computing tools. (Analyze)	PO1, PO2, PO4
CO4	Develop hybrid intelligent systems. (Create)	PO1, PO2, PO3, PO4
CO5	Evaluate and compare the performance of CI-based systems. (Evaluate)	PO1, PO2, PO4, PO5

TEXTBOOKS:

1. S. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, PHI Learning.
2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India.

REFERENCE BOOKS:

1. S.N. Sivanandam, S. N. Deepa, Principles of Soft Computing, Wiley India.
2. Simon Haykin, Neural Networks and Learning Machines, Pearson.
3. James Kennedy and Russell C. Eberhart, Swarm Intelligence, Morgan Kaufmann.
4. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

III B.Tech. - I Semester

COURSE CODE
23CSD351A

DATA VISUALIZATION
(Professional Elective-I)

L T P C
3 0 0 3

PRE-REQUISITES:NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Discuss the importance of Data Visualization
2. Demonstrate story telling
3. Explain the environment of Tableau

UNIT -I:

(9)

Introduction, the importance of Context, Choosing and effective visual

UNIT-II:

(9)

Clutter is your enemy, Focus your audience `s attention, Lessons in Storytelling

UNIT-III:

(9)

Communicating data: A step in the process, a model of communication, Three types of communication problems, six principles of communicating data. Introduction to Tableau: Using Tableau, Tableau products, connecting to data. How much and How many: Communicating how much, communicating how many Ratios and Rates: Ratios, Rates

UNIT-IV:

(9)

Proportions and Percentages: Part to whole, current to historical, actual to target. Mean and Median Variation and Uncertainty: Respecting variation, Variation over Time-Control charts, Understanding uncertainty

UNIT-V:

(9)

Multiple Quantities: Scatter plots, Stacked Bars, Regression and Trend Lines, The Quadrant Chart Changes over time: The origin of time charts, the line chart, the dual axis line chart, the connected scatter plot, the date filed type and seasonality, the timeline, the slope graph Maps and Location: One special map, circle maps, filled maps, dual encoded maps.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the importance of context and the principles of effective visual design for data communication.	PO1, PO2
CO2	Identify and eliminate visual clutter to enhance audience focus and storytelling in data presentations.	PO2, PO3
CO3	Apply principles of effective communication to interpret and present data using visual and narrative techniques in Tableau.	PO2, PO3, PO4
CO4	Analyze variation and uncertainty using statistical tools such as mean, median, and control charts.	PO1, PO3, PO4
CO5	Explore changes over time and geographic patterns using time-based charts and map-based visualizations in Tableau.	PO2, PO3, PO4, PO5

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. Cole Nussbaumer Knaflic, Storytelling with data, Wiley 13 oct 2015
2. Ben Jones, Communicating Data with Tableau, O `Reilly June 2014

REFERENCE BOOKS:

1. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing
2. Informational Relationships, O `Reilly.
3. Andy Kirk, Data Visualization: A Successful Design Process, PAKT.
4. Scott Murray, Interactive Data Visualization for Web, O `Reilly.

REFERENCE WEBSITE:

1. Data Analysis and Visualization Foundations | Coursera
2. Data Visualization | Coursera

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	3	-	-	-	-	-	-	-	-	-
CO.3	-	3	3	3	-	-	-	-	-	-	-	-
CO.4	3	-	3	3	-	-	-	-	-	-	-	-
CO.5	-	3	3	3	3	-	-	-	-	-	-	-
CO*	3	3	3	3	3	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23CSD351B	EXPLORATORY DATA ANALYSIS (Professional Elective-I)	L	T	P	C
		3	0	0	3

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the principles and practices of Exploratory Data Analysis (EDA) using Python.
2. To teach techniques for data cleaning, preprocessing, transformation, and visualization.
3. To apply statistical techniques and visual methods to discover patterns and relationships.
4. To gain experience using popular Python libraries such as NumPy, Pandas, Matplotlib, and Seaborn.
5. To prepare datasets for further machine learning and predictive modeling.

UNIT -1: INTRODUCTION TO EDA AND PYTHON ENVIRONMENT (9)

Introduction to Data Science and EDA, Importance of EDA in Data Science Life Cycle, Setting up Python Environment: Jupyter, Anaconda, VS Code, Introduction to NumPy and Pandas: Arrays, Series, Data Frames, Data loading, viewing, basic operations (info, describe, shape)

UNIT -2: DATA WRANGLING AND PREPROCESSING (9)

Handling Missing Data (mean, median, drop, interpolation), Dealing with Duplicates, Outliers, and Anomalies, Encoding Categorical Variables (Label, One-hot), Data Transformation: Scaling, Normalization, Binning, Data Types Conversion and Data Type Casting.

UNIT -3: UNIVARIATE AND BIVARIATE ANALYSIS (9)

Measures of Central Tendency and Dispersion, Distribution Plots: Histograms, Boxplots, KDE, Bar Charts, Count Plots, Pie Charts, Bivariate Analysis: Scatter Plots, Pair Plots, Heatmaps, Correlation and Covariance Analysis

UNIT -4: DATA VISUALIZATION TECHNIQUES (9)

Visualization with Matplotlib and Seaborn, Customizing Plots: Titles, Legends, Labels, Themes, Advanced Visuals: Violin Plots, Strip Plots, Swarm Plots, Multivariate Visualization and Subplots, Plotly and Interactive Visualizations (basic overview)

UNIT -5: EDA CASE STUDIES AND REAL-TIME DATASETS (9)

Step-by-step EDA on Sample Datasets (Titanic, Iris, Sales, etc.), Outlier Detection Techniques, Feature Engineering Techniques in EDA, EDA Report Generation using Python Notebooks, Preparing Data for Machine Learning Models

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Describe the principles, concepts, and importance of Exploratory Data Analysis, including data types, data sources, and data preprocessing techniques.	PO1,PO2
CO2	Explain and apply various data cleaning, transformation, and feature engineering techniques through practical examples.	PO1,PO3
CO3	Construct and interpret graphical representations of data using plots, charts, and visual analytics tools to identify trends, patterns, and anomalies.	PO1,PO2,PO4
CO4	Identify and compute summary statistics, correlations, distributions, and other numerical measures to derive meaningful insights from datasets.	PO1,PO2,PO3, PO4
CO5	Analyze real-world datasets, draw insightful conclusions, and evaluate challenges, limitations, and ethical considerations in data handling and interpretation.	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, O'Reilly, 2016.
2. Wes McKinney, Python for Data Analysis, 2nd Edition, O'Reilly, 2018.

REFERENCE BOOKS:

1. Joel Grus, Data Science from Scratch, O'Reilly, 2019.
2. Aurelien Geron, Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow, 2nd Edition, O'Reilly, 2019.
3. Allen B. Downey, Think Stats: Probability and Statistics for Programmers, O'Reilly, 2014.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

III B.Tech. - I Semester

**COURSE CODE
23CSE354D**

**SOFT COMPUTING
(Professional Elective-I)**

**L T P C
3 0 0 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES

1. Familiarize with soft computing concepts.
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience.
3. Familiarize the Neuro-Fuzzy modelling using Classification and Clustering techniques.
4. Learn the concepts of Genetic algorithm and its applications.
5. Acquire the knowledge of Rough Sets.

UNIT – I

(9)

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT- II

(9)

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT- III

(9)

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT- IV

(9)

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT- V

(9)

Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

COURSE OUTCOMES:

On successful completion of the course, student will be able to		POs related to COs
CO1	Understand the concepts on Soft computing and methods and Characteristics.	PO1
CO2	Understand and develop Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic	PO5
CO3	Understand the concepts Fuzzy Decision Making, Particle Swarm Optimization	PO2
CO4	Understand concepts Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties	PO6
CO5	Understand the importance Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques	PO4

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

TEXT BOOK:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, –Principles of Soft ComputingII , 2nd edition, Wiley India, 2008.
2. David E. Goldberg, –Genetic Algorithms-In Search, optimization and Machine learningII , Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, –Neuro-Fuzzy and Soft ComputingII , Pearson Education, 2004.

CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	-	-	-	-	-	-	-	-	-	-
C02	-	3	-	-	-	-	-	-	-	-	-	-
C03	-	-	2	-	-	-	-	-	-	-	-	-
C04	-	-	-	3	-	-	-	-	-	-	-	-
C05	-	-	-	-	2	-	-	-	-	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	-	-	-	-	-	-	-	-	2	-	-
C09	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	2	3	2	-	-	3	3	2	-	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

**COURSE CODE
230CE351A**

**GREEN BUILDINGS (OPEN ELECTIVE -I)
(Civil Branch)**

**L T P C
3 0 0 3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the fundamental concepts of green buildings, their necessity, and sustainable features.
2. To analyze green building concepts, rating systems, and their benefits in India.
3. To apply green building design principles, energy efficiency measures, and renewable energy sources.
4. To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.
5. To assess material conservation strategies, waste management, and indoor environmentally quality in green buildings.

UNIT- I

(9)

Introduction to Green Building– Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable Features for Green Buildings.

UNIT- II

(9)

Green Building Concepts and Practices– Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency.

UNIT-III

(9)

Green Building Design– Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT- IV

(9)

Air Conditioning– Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of the Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT- V

(9)

Material Conservation– Handling of Non-Process Waste, Waste Reduction During Construction, Materials with Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	CONSTRUCTION TECHNOLOGY AND MANAGEMENT	L	T	P	C
230CE351B	(OPENELECTIVE- I)	3	0	0	3
	(Civil Branch)				

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the fundamental concepts of green buildings, their necessity, and sustainable features.
2. To analyze green building concepts, rating systems, and their benefits in India.
3. To apply green building design principles, energy efficiency measures, and renewable energy sources.
4. To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.
5. To assess material conservation strategies, waste management, and indoor environmentally quality in green buildings.

UNIT- I **(9)**

Introduction: Project forms, Management Objectives and Functions; Organizational Chart of a Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership and Team - Work; Ethics, Morale, Delegation and Accountability

UNIT- II **(9)**

Man, and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.

UNIT-III **(9)**

Planning, Scheduling and Project Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network-formulation and Time Computation.

UNIT-IV **(9)**

Contracts: Types of Contracts, formation of Contract – Contract Conditions – Contract for Labour, Material, Design, and Construction – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.

UNIT- V **(9)**

Safety Management – Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand project management fundamentals, organizational structures, and leadership principles in construction.	PO1,PO6,PO8, PO9
CO2	Analyze manpower planning, equipment management, and cost estimation in civil engineering projects.	PO2,PO5,PO12
CO3	Apply planning, scheduling, and project management techniques such as CPM and PERT.	PO3,PO5,PO4, PO10
CO4	Evaluate various contract types, contract formation, and legal aspects in construction management.	PO3,PO5,PO4, PO8
CO5	Assess safety management practices, accident prevention strategies, and quality management systems in construction.	PO6,PO7,PO8, PO9

TEXT BOOKS:

1. Construction Project Management, SK. Sears, GA. Sears, RH. Clough, John Wiley and Sons, 6th Edition, 2016.
2. Construction Project Scheduling and Control by Saleh Mubarak, 4th Edition, 2019
3. Pandey, I.M (2021) Financial Management 12th edition. Pearson India Education Services Pvt. Ltd.

REFERENCE BOOKS:

1. Brien, J.O. and Plotnick, F.L., CPM in Construction Management, McGraw Hill, 2010.
2. Punima, B.C., and Khandelwal, K.K., Project Planning and control with PERT and CPM, Laxmi Publications, 2002.
3. Construction Methods and Management: Pearson New International Edition 8th Edition Stephens Nominally.
4. Rhoden, M and Cato B, Construction Management and Organizational Behavior, Wiley-Blackwell, 2016.

ONLINE LEARNING RESOURCES:

1. <https://archive.nptel.ac.in/courses/105/104/105104161/>
2. <https://archive.nptel.ac.in/courses/105/103/105103093/>

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	3	-	-	-	-	2	-	2	2	-	-	-
CO2	-	3	-	-	2	-	-	-	-	-	-	2
CO3	-	-	3	3	3	-	-	-	-	2	-	-
CO4	-	-	3	3	3	-	-	2	-	-	-	-
CO5	-	-	-	-	-	3	3	3	2	-	-	-
CO	3	3	3	3	2.6	2.5	3	3.5	2	2	-	2

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE 23OECE351A	ELECTRONIC CIRCUITS (OPENELECTIVE- I)	L	T	P	C
		3	0	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand semiconductor diodes, their characteristics and applications.
2. To explore the operation, configurations, and biasing of BJTs.
3. To study the operation, analysis, and coupling techniques of BJT amplifiers.
4. To learn the operation, applications and uses of feedback amplifiers and oscillators.
5. To analyze the characteristics, configurations, and applications of operational amplifiers.

UNIT -1: SEMICONDUCTOR DIODES (9)

Semiconductor Diode and Applications: Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator.

UNIT -2: BJT AND ITS BIASING (9)

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias.

UNIT -3: SINGLE STAGE AMPLIFIER (9)

Single stage amplifiers: Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.

UNIT -4: FEEDBACK AMPLIFIERS AND OSCILLATORS (9)

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).

Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators

UNIT -5: OPAMP AND ITS APPLICATIONS (9)

Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op- amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp: Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	SUSTAINBLE ENERGY TECHNOLOGIES	L	T	P	C
23OME351A	(OPENELECTIVE- I)	3	0	0	3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To demonstrate the importance the impact of solar radiation, solar PVmodules
2. To understand the principles of storage in PV systems
3. To discuss solar energy storage systems and their applications.
4. To get knowledge in wind energy and bio-mass
5. To gain insights in geothermal energy, ocean energy and fuel cells.

UNIT –1: SOLAR RADIATION: (9)

Roles and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

SOLAR PV MODULES AND PV SYSTEMS: PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance

UNIT –2: STORAGE IN PV SYSTEMS: (9)

Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT –3: (9)

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT –4: (9)

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT –5: (9)

GEOTHERMAL ENERGY: Origin, Applications, Types of Geothermal Resources, Relative Merits. **OCEAN ENERGY:** Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges.

FUEL CELLS: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	MATHEMATICS FOR MACHINE LEARNING AND AI	L	T	P	C
23OSH351A	(OPENELECTIVE- I)	3	0	0	3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES

1. To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.
2. To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.
3. To equip students with optimization techniques and graph-based methods used in AI applications. To develop critical problem-solving skills for analysing mathematical formulations in AI/ML

UNIT I: LINEAR ALGEBRA FOR MACHINE LEARNING (9)

Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigen values, eigen vectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT II: PROBABILITY AND STATISTICS FOR AI (9)

Probability distributions: Gaussian, Binomial, Poisson. Bayes' Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP). Entropy and Kullback - Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT III: OPTIMIZATION TECHNIQUES FOR ML (9)

Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization: Lagrange multipliers and KKT conditions. Gradient Descent and its variants (Momentum, Adam) Newton's method, BFGS method.

UNIT IV: VECTOR CALCULUS & TRANSFORMATIONS (9)

Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT V: GRAPH THEORY FOR AI (9)

Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Apply linear algebra concepts to ML techniques like PCA and regression.	PO1,PO2,PO3,PO4,PO5,PO12
CO2	Analyze probabilistic models and statistical methods for AI applications.	PO1,PO2,PO3,PO4,PO5,PO12
CO3	Implement optimization techniques for machine learning algorithms.	PO1,PO2,PO3,PO4,PO5,PO6,PO12
CO4	Utilize vector calculus and transformations in AI-based models.	PO1,PO2,PO3,PO4,PO5,PO12
CO5	Develop graph-based AI models using mathematical representations.	PO1,PO2,PO3,PO4,PO5,PO12

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. Mathematics for Machine Learning by Marc Peter Deisenroth, A.Aldo Faisal, Cheng Soon Ong, Cambridge University Press, 2020.
2. Pattern Recognition and Machine Learning by Christopher Bishop, Springer.

REFERENCE BOOKS:

1. Gilbert Strang, Linear Algebra and Its Applications, Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, Graph Theory and Its Applications, CRC Press, 2018.

REFERENCE WEBSITE:

1. MIT–Mathematics for Machine Learning <https://ocw.mit.edu>
2. Stanford CS229–Machine Learning Course <https://cs229.stanford.edu/>
3. Deep AI–Mathematical Foundations for AI <https://deepai.org>

CO-PO MAPPING

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	MATERIALS CHARACTERIZATION TECHNIQUES	L	T	P	C
23OSH351B	(OPEN ELECTIVE-I)	3	0	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide exposure to various characterization techniques.
2. To explain the fundamental principles and analytical methods of different spectroscopic techniques.
3. To describe the working principle, limitations, and applications of the Scanning Electron Microscope (SEM).
4. To illustrate the operation of the Transmission Electron Microscope (TEM), including Selected Area Electron Diffraction (SAED) patterns and its applications.
5. To educate on the use of advanced electrical and magnetic instruments in material characterization.

UNIT-I: STRUCTURE ANALYSIS BY POWDER X-RAY DIFFRACTION (9)

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT-II: MICROSCOPY TECHNIQUE -1- SCANNING ELECTRON MICROSCOPY (SEM) (9)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT-III: MICROSCOPY TECHNIQUE -2 - TRANSMISSION ELECTRON MICROSCOPY (TEM) (9)

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy

UNIT-IV: SPECTROSCOPY TECHNIQUES (9)

Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT V ELECTRICAL & MAGNETIC CHARACTERIZATION TECHNIQUES (9)

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES

	On successful completion of the course, students will be able to	PO2
CO1	Employ different analytical methods to analyze the crystal structure and crystallite sizes	PO1, PO2,PO3,PO4,PO5
CO2	Investigate the morphology of the sample by using a Scanning Electron Microscope	PO1, PO2,PO3,PO4,PO5
CO3	Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope	PO1, PO2,PO3,PO4,PO5
CO4	Describe the principle and experimental arrangement of various spectroscopic techniques	PO1, PO2,PO3,Po4
CO5	Understand the construction and working principle of various Electrical & Magnetic Characterization technique	PO1, PO2,PO3,PO4

TEXTBOOKS:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2013.
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008

REFERENCE BOOKS:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville Banwell and Elaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity& Stuart R Stocks, Prentice Hall , 2001 – Science.
3. Practical Guide to Materials Characterization: Techniques and Applications - Khalid Sultan – Wiley – 2021.
4. Materials Characterization Techniques -Sam Zhang, Lin Li, Ashok Kumar -CRC Press - 2008

REFERENCE LINK :

1. <https://nptel.ac.in/courses/115/103/115103030/>
2. https://nptel.ac.in/content/syllabus_pdf/113106034.pdf
3. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm0S8/>

CO-PO MAPPING

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

III B.Tech. - I Semester

**COURSE CODE
23OSH351C**

**CHEMISTRY OF ENERGY SYSTEMS
(OPEN ELECTIVE-I)**

**L T P C
3 0 0 3**

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
2. To understand the basic concepts of processing and limitations of Fuel cells & their applications.
3. To impart knowledge to the students about fundamental concepts of photo chemical cells, reactions and applications.
4. Necessarily of harnessing alternate energy resources such as solar energy and its basic concepts.
5. To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method.

UNIT-1: ELECTROCHEMICAL SYSTEMS

(9)

Galvanic cell, Nernst equation, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries- Introduction, Lead-acid, Nickel- cadmium, Lithium-ion batteries and their applications.

UNIT-2: FUEL CELLS

(9)

Fuel cell- Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT-3: PHOTO AND PHOTO ELECTROCHEMICAL CONVERSIONS

(9)

Photochemical cells Introduction and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT-4: SOLAR ENERGY

(9)

Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT-5: HYDROGEN STORAGE

(9)

Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel, and Organic hydrogen carriers.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Solve the problems based on electrode potential, Describe the Galvanic Cell Differentiate between Lead acid and Lithium-ion batteries, Illustrate the electrical double layer.	PO1, PO2, PO2, PO4, PO5
CO2	Describe the working Principle of Fuel cell, Explain the efficiency of the fuel cell. Discuss about the Basic design of fuel cells, Classify the fuel cell	PO1, PO2, PO2, PO4, PO6
CO3	Differentiate between Photo and Photo electrochemical Conversions, Illustrate the photochemical cells, Identify the applications of photochemical reactions, Interpret advantages of photoelectron catalytic conversion.	PO1, PO2, PO2, PO4, PO5
CO4	Apply the photo voltaic technology, Demonstrate about solar energy and prospects Illustrate the Solar cells, discuss about concentrated solar power	PO1, PO2, PO2, PO4, PO5
CO5	Differentiate Chemical and Physical methods of hydrogen storage, Discuss the metal organic frame work, Illustrate the carbon and metal oxide porous structures Describe the liquification methods.	PO1, PO2, PO2, PO4, PO5

TEXT BOOKS:

1. Physical chemistry by Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins

REFERENCE BOOKS:

1. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services And corporation)
2. Hand book of solar energy and applications by Arvind Tiwari and Shyam.
3. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
4. Hydrogen storage by Levine Klebonoff

CO-PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	ENGLISH FOR COMPETITIVE EXAMINATIONS	L	T	P	C
23OSH351D	(OPEN ELECTIVE-I)	3	0	0	3

PRE-REQUISITES:

COURSE OBJECTIVES:

1. To enable the students to learn about the structure of competitive English
2. To understand the grammatical aspects and identify the errors
3. To enhance verbal ability and identify the errors
4. To improve word power to answer competitive challenges To make the ready to crack Competitive exams

UNIT-I: GRAMMAR-1

(9)

Nouns-classification-errors-Pronouns-types-errors-Adjectives-types-errors-Articles-definite indefinite – Degrees of Comparison -Adverbs-types- errors-Conjunctions-usage-repositions-usage-Tag Questions, types-identifying errors-Practice

UNIT-II: GRAMMAR-2

(9)

Verbs-tenses-structure-usages-negatives-positives-timeadverbs-Sequenceoftenses-IfClause-Voice-activevoiceandpassivevoice-reportedSpeech-Agreement-subjectandverb-Modals-Spotting Errors - Practices

UNIT-III:VERBALABILITY

(9)

Sentence completion-Verbal analogies-Word Groups-Instructions-Critical reasoning-Verbal Deduction-Select appropriate pair - Reading Comprehension - Paragraph - Jumbles - Selecting the proper statement byreading a given paragraph.

UNIT-IV READING COMPREHENSION AND VOCUBULARY

(9)

Competitive Vocabulary – Word building – Memory Techniques – Synonyms, Antonyms, Affixes - Prefixes&suffix-OneWord Substitutes-Compound words-Phrasal Verbs –Idioms and phrases- Homophones – Linking words – Modifiers – Intensifiers – Mastering Competitive Vocabulary – Cracking the unknowing passage –Speed Read info Techniques-Skimming and Scanning- Types of answering – Elimination methods.

UNIT-V:WRITING FOR COMPETITIVE EXAMINATIONS

(9)

Punctuations and Spelling rules –Word order-Sub skills of Writing –paragraph meaning – Salient features – types – Note making – Note taking- Summarizing - precise writing - Expansion of proverbs – Essay Writing – types.

Total Hours: 45

COURSE OUTCOMES

On successful completion of the course, students will be able to		POs
CO1.	Identify the basics of English grammar and its importance	PO2
CO2.	Explain the use of grammatical structures in sentences	PO5
CO3.	Demonstrate the ability to use various concepts in grammar and vocabulary and the applications in every day use and in competitive exams	PO6,PO10
CO4.	Analyze an unknown passage and reach conclusions about it.	PO10
CO5.	Choose the appropriate form of verbs in framing sentences	PO4

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

TEXTBOOKS:

1. Wren Martin, English for competitive examinations, S. hand &Co,2021.
2. Objective English for competitive examinations, Tata McGrawHill, NewDelhi ,2014.

REFERENCEBOOKS:

1. Hari Mohan Prasad objective English for competitive examination Tata McGrawhill, Delhi,2014.
2. Philip Sunil Solomon English for Success in competitive exams, Oxford 2016.
3. Shalini Verma, Word power made Handy S. Chand Publications.
4. Neira Anjann a Dev &Co, Creative Writing: A Beginner's Manual Pearson Education India, 2008.
5. Abhishek Jain, Vocabulary learning Techniques Vol I &IIRGlobalPublishers2013.
6. Michael Swan, Practical English Usage, Oxford,2006.

ONLINE REFERENCE:

1. <https://www.grammar.cl/English/partsofspeech.htm>
2. <https://academicguides.waldenu.edu/writingcenter/grammar/PartsofSpeech>
3. [https://learnEnglish.britishcouncil.org/grammar/enlgish-grammar--reference/active-passive-voice.](https://learnEnglish.britishcouncil.org/grammar/enlgish-grammar--reference/active-passive-voice)
4. <https://www.languagetool.org/Insights/post/verb/tenses/>
5. <https://www.britishcouncil.in/blog/best/freeEnglish-learningresources-Britishcouncil>
6. <https://www.careerride.com/post/social-essays-for-competitive-exams-586.aspx>

CO-PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - I Semester

COURSE CODE	ENTREPRENEURSHIP AND NEW VENTURE	L	T	P	C
23OSH351E	CREATION	3	0	0	3
	(OPEN ELECTIVE-I)				

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To foster an entrepreneurial mind-set for venture creation and entrepreneurial leadership.
2. To encourage creativity and innovation and also validating customer personas.
3. To enable the students about understand MVP development and validation techniques to determine product-market fit and initiate solution design, prototype for proof of concept.
4. To make the students to create a business plan, financial planning and feasibility analysis to assess the financial viability of a venture.
5. To enable the students to identify potential and aspiration for scale vis-à-vis your venture idea.

UNIT –1: ENTREPRENEURSHIP FUNDAMENTALS AND CONTEXT (9)

Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models and their role in economic development, an understanding of how to build an entrepreneurial mindset, skill sets, attributes, and networks while on campus.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity

UNIT –2: PROBLEM & CUSTOMER IDENTIFICATION (9)

Understanding and analysing the macro problem and industry perspective – technological, socioeconomic, and urbanization trends and their implications on new opportunities, identifying passion, identifying and defining the problem using design thinking principles, analysing the problem and validating with the potential customer, understanding customer segmentation, creating and validating customer personas.

Core Teaching Tool: Several types of activities including Class, game, Gen AI, Get out of the Building and Venture Activity.

UNIT –3: SOLUTION DESIGN, PROTOTYPING & OPPORTUNITY ASSESSMENT AND SIZING (9)

Understanding customer jobs-to-be-done and crafting innovative solution design to map to customer's needs and create a strong value proposition, understanding prototyping and Minimum Viable Product (MVP), developing a feasibility prototype with differentiating value, features, and benefits, assessing relative market position via competition analysis, sizing the market and assessing the scope and potential scale of the opportunity.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

UNIT –4: BUSINESS & FINANCIAL MODEL, GO-TO-MARKET PLAN (9)

Introduction to business model and types, lean approach, 9-block canvas model, riskiest assumptions to business models, importance of Build-Measure-Learn approach. **Business Planning:** components of business plan – sales plan, people plan, and financial plan. **Financial planning:** types of cost, preparing a financial plan for profitability using a financial template, understanding basics of unit economics, and analysing financial performance. Introduction to marketing and sales, selecting the right channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to

your venture, identifying sources of funds – debt and equity, mapping the start-up life cycle to funding options.

Core Teaching Tool: Founder Case Studies –Samaand Securely Share; Class activity and discussions; Venture Activities.

UNIT –5: SCALE OUTLOOK AND VENTURE PITCH READINESS (9)

Understand and identify potential and aspiration for scale vis-à-vis your venture idea. Persuasive storytelling and its key components. Build an investor-ready pitch deck.

Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

Total Hours: 45

COURSE OUTCOMES:

COs	On successful completion of the course, students will be able to	POs
CO1	Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship	PO9, PO12
CO2	Comprehend the process of problem-opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution	PO2, PO4, PO5, PO9, PO11, PO12
CO3	Build a prototype for proof of concept and validate the MVP of their practice venture idea	PO3, PO4, PO5, PO6, PO9, PO11, PO12
CO4	Analyze and refine business models to ensure sustainability and profitability of a venture	PO7, PO9, PO10, PO11, PO12
CO5	Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders	PO9, PO11, PO12

TEXT BOOKS:

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha. Entrepreneurship, McGraw Hill, 11th Edition (2020).
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business (2011).
3. Osterwalder, A., & Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons (2010).

REFERENCE BOOKS:

1. Simon Sinek. Start with Why. Penguin Books Limited (2011).
2. Brown, Tim. Change by Design Revised & Updated: How Design Thinking Transforms Organizations and Inspires Innovation. Harper Business (2019).
3. Namita Thapar. The Dolphin and the Shark: Stories on Entrepreneurship. Penguin Books Limited (2022).
4. Saras D. Sarasvathy. Effectuation: Elements of Entrepreneurial Expertise. Elgar Publishing Ltd. (2008).

REFERENCE WEBSITE:

1. Ignite 5.0 Course – Wadhvani Platform (Includes 200+ components of custom- created modular content and 500+ components of the most relevant curated content).

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-	-	-	-	2	-	-	3
CO.2	-	3	-	3	2	-	-	-	3	-	2	3
CO.3	-	-	3	2	3	2	-	-	3	-	2	3
CO.4	-	-	-	-	-	-	2	-	3	3	2	3
CO.5	-	-	-	-	-	-	-	-	3	-	2	3
CO*	-	3	3	2.5	2.5	2	2	-	2.8	3	2	3

23CSM361T	III B.Tech. - II Semester DEEP LEARNING (PROFESSIONAL CORE-CSM/PROF. ELECTIVE- CSD)	L T P C 3 - - 3
------------------	--	----------------------------

PRE-REQUISITES: Machine Learning basics

COURSE EDUCATIONAL OBJECTIVES:

1. Demonstrate the major technology trends driving Deep Learning
2. Build, train, and apply fully connected deep neural networks
3. Implement efficient (vectorized) neural networks
4. Analyse the key parameters and hyper parameters in a neural network's architecture
5. Demonstrate the sequence modeling and Networks of Deep Learning

UNIT-I: LINEAR ALGEBRA, PROBABILITY AND NUMERICAL COMPUTATION (9)

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory.

Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT-II: MACHINE LEARNING AND DEEP FEED FORWARD NETWORKS (9)

Machine Learning: Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning.

Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT-III: REGULARIZATION AND OPTIMIZATION OF DL MODELS (9)

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier.

Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT-IV: CONVOLUTIONAL NETWORKS (9)

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT-V: SEQUENCE MODELING (9)

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Total Hours:45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Demonstrate the mathematical foundation of neural network	PO1, PO2, PO3, PO4
CO2	Describe the machine learning basics	PO1, PO2, PO3, PO4
CO3	Differentiate architecture of deep neural network	PO1, PO2, PO3, PO4
CO4	Build a convolutional neural network	PO1, PO2, PO3, PO4
CO5	Build and train RNN and LSTMs	PO1, PO2, PO3, PO4

TEXT BOOKS:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press,2016.
2. Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition,2017.

REFERENCE BOOKS:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers,2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

ONLINE LEARNING RESOURCES:

1. <https://keras.io/datasets/>
2. <http://deeplearning.net/tutorial/deeplearning.pdf>
3. <https://arxiv.org/pdf/1404.7828v4.pdf>
4. <https://www.cse.iitm.ac.in/~miteshk/CS7015.html>
5. <https://www.deeplearningbook.org>
6. <https://nptel.ac.in/courses/106105215>

CO-PO MAPPING:

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

23CAI353T

III B.Tech. - II Semester
NATURAL LANGUAGE PROCESSING
(CSM)

L T P C
3 - - 3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. Basics of NLP, Morphology, Tokenization, N-gram Models
2. POS Tagging, Parsing, Treebank's, Ambiguity Handling
3. Word Sense Disambiguation, Semantic Parsing, Sentiment Analysis
4. Machine Translation, Transformers, BERT/GPT, Ethical NLP
5. Speech Recognition, Feature Extraction, Discourse Analysis

UNIT –1: INTRODUCTION TO NLP (9)

Introduction to NLP: Origins and Challenges, Language and Grammar in NLP, Regular Expressions and Finite-State Automata, Tokenization: Text Segmentation and Sentence Splitting, Morphological Parsing: Stemming and Lemmatization, Spelling Error Detection and Correction, Minimum Edit Distance and Applications, Statistical Language Models: Unigram, Bigram, and Trigram Models, Processing Indian Languages in NLP.

UNIT –2: WORD-LEVEL AND SYNTACTIC ANALYSIS (9)

Introduction, Part-of-Speech (POS) Tagging: Rule-Based, Stochastic and Transformation-Based Approaches, Hidden Markov Models (HMM) and Maximum Entropy Models for POS Tagging, Context-Free Grammar (CFG) and Constituency Parsing, Treebanks and Normal Forms for Grammar, Top-Down and Bottom-Up Parsing Strategies, CYK Parsing Algorithm, Probabilistic Context-Free Grammars (PCFGs), Feature Structures and Unification.

UNIT –3: TEXT CLASSIFICATION AND INFORMATION RETRIEVAL (9)

Naïve Bayes Classifier for Text Classification, Training and Optimization for Sentiment Analysis, Information Retrieval: Basic Concepts and Design Features, Information Retrieval Models: Classical, Non-Classical, and Alternative Models, Cluster Model, Fuzzy Model, and LSTM-Based Information Retrieval, Word Sense Disambiguation (WSD) Methods: Supervised and Dictionary-Based Approaches.

UNIT –4: MACHINE TRANSLATION AND SEMANTIC PROCESSING (9)

Introduction to Machine Translation (MT), Language Divergence and Typology in MT Encoder- Decoder Model for Machine Translation, Translating in Low-Resource Scenarios, MT Evaluation Metrics and Techniques, Bias and Ethical Issues in NLP and Machine Translation, Semantic Analysis and First-Order Logic in NLP, Thematic Roles and Selectional Restrictions in Semantics, Word Senses and Relations Between Senses.

UNIT –5: SPEECH PROCESSING AND ADVANCED NLP MODELS (9)

Speech Fundamentals: Phonetics and Acoustic Phonetics, Digital Signal Processing in Speech Analysis, Feature Extraction in Speech: Short-Time Fourier Transform (STFT), Mel-Frequency Cepstral Coefficients (MFCC) and Perceptual Linear Prediction (PLP), Hidden Markov Models (HMMs) in Speech Recognition.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand morphological processing and the structure of words and documents.	PO1, PO2
CO2	Analyze syntactic structures using various parsing algorithms.	PO1, PO3
CO3	Apply semantic parsing techniques to interpret natural language text.	PO1, PO2, PO4
CO4	Understand predicate-argument structures and meaning representation systems.	PO1, PO2, PO3, PO4
CO5	Apply cross-lingual language models and speech recognition techniques in NLP applications	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. Daniel Jurafsky & James H. Martin – Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Pearson Education, 2023.
2. Tanveer Siddiqui & U.S. Tiwary – Natural Language Processing and Information Retrieval, Oxford University Press.

REFERENCE BOOKS:

1. T.V. Geetha – Understanding Natural Language Processing – Machine Learning and Deep Learning Perspectives, Pearson, 2024.
2. Akshay Kulkarni & Adarsha Shivananda – Natural Language Processing Recipes - Unlocking Text Data with Machine Learning and Deep Learning using Python, Apress, 2019.

REFERENCE WEBSITE:

1. <https://www.youtube.com/watch?v=M7SWr5xObkA>
2. https://onlinecourses.nptel.ac.in/noc23_cs45/preview
3. <https://archive.nptel.ac.in/courses/106/106/106106211/>

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	3	2.3	2	-	-	-	-	-	-	-

III B.Tech. - II Semester

**23CSE353T OPERATING SYSTEM & SYSTEM PROGRAMMING L T P C
(PROFESSIONAL CORE) 3 - - 3**

COURSE EDUCATIONAL OBJECTIVES:

- To introduce the fundamentals of operating systems, process management, and synchronization techniques.
- To explain memory, file, and storage management techniques including paging, segmentation, and file system structures.
- To explore I/O systems, device management, system protection, and provide a practical overview of Unix/Linux systems.
- To understand the architecture and components of system software including language processors, assemblers, macro processors, linkers, and loaders.
- To analyze the concepts of system programming including scanning, parsing, compilation, and process-level system programming in Unix/Linux.

UNIT -1: FUNDAMENTALS OF OPERATING SYSTEMS AND PROCESS MANAGEMENT (9)

Introduction to Operating Systems: Definition and Basics, Generations and Types of Operating Systems, OS Structure: Layered, Monolithic, Microkernel, OS Services, System Calls, System Boot, System Programs, Virtual Machines, Process Management: Process Concepts, Process States, Process Control Block, Context Switching, Threads and Multithreading, Process Scheduling: Scheduling Criteria and Scheduling Algorithms, Multiprocessor Scheduling: Types and Performance Evaluation, Process Synchronization and Deadlocks: Race Conditions, Critical Section, Mutual Exclusion, Peterson's Solution, Semaphores, Monitors Classic IP, C Problems: Reader-Writers, Dining Philosophers, Deadlocks: Definition, Characteristics, Prevention, Avoidance, Detection and Recovery.

UNIT -2: MEMORY, FILE, AND STORAGE MANAGEMENT (9)

Memory Management: Logical vs. Physical Address Mapping, Contiguous Memory Allocation, Internal and External Fragmentation, Compaction, Paging and Page Tables, Segmentation, Virtual Memory: Demand Paging, Page Faults, Page Replacement Algorithms, Thrashing and Working Set Model, File System Management: File Concepts, Access Methods, File Types and Operations, Directory Structure, File System Structure, Allocation Methods, Free-Space Management, Directory Implementation. Storage Management: Mass Storage: Disk Structure, RAID Levels, Disk Scheduling Algorithms, Swap Space Management, Stable Storage, Tertiary Storage Structure.

UNIT -3: I/O SYSTEMS, SECURITY, AND UNIX/LINUX OVERVIEW (9)

I/O System Management: I/O Hardware: Devices, Device Controllers, Direct Memory Access, I/O Software: Interrupt Handlers, Device Drivers, Device-Independent I/O Software, System Protection and Security: Security Environment, Security Design Principles, User Authentication, Protection Mechanisms, Protection Domain, Access Control List, Unix/Linux Overview & Case Studies: Development of Unix/Linux, Role of Kernel, System Calls, Elementary Linux Commands, Shell Programming, Directory Structure, System Administration.

UNIT -4: SYSTEM SOFTWARE AND LANGUAGE PROCESSING (9)

Overview of System Software: Software and Software Hierarchy, Systems Programming and Machine Structure, Interfaces, Address Space, and Computer Languages, System Software Development and Recent Trends, Language Processors: Programming Languages and Language Processing, Symbol Tables and Data Structures for Language Processing, Search and Allocation Data Structures, Assemblers and Macro Processors: Elements of Assembly

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

Language Programming, Design and Types of Assemblers, Macro Definitions, Expansion, Nested Macros, and Advanced Macro Features, Design of Macro Assemblers and Macro Processors, Linkers and Loaders: Concept of Linking and Relocation, Linking in MS- DOS, Dynamic Linking, Loading Schemes: Sequential, Direct, Absolute, Relocating, and Linking Loaders, Comparison of Linkers and Loaders.

UNIT -5: SYSTEM PROGRAMMING (9)

Scanning and Parsing: Programming Language Grammars and Classification, Ambiguity in Grammatical Specification, Scanning, Parsing, Compilers and Interpreters: Compilation Process, Semantic Gap, Binding, and Scope Rules, Memory Allocation, Compilation of Expressions & Control Structures, Code Optimization, Overview of Interpreters and Debuggers, Operating System Command & Shell Basics: C Development Tools, Machine-Level Representation of Data and Programs, System-Level Programming and Concurrency: File I/O, Process Creation & Control (fork, exec), Pipes, Signals, and Basic Threading.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Describe the principles, design, and functioning of operating systems, including process management, memory management, file systems, and I/O operations.	PO1,PO2
CO2	Explain system call interfaces and demonstrate basic OS concepts through practical examples	PO1,PO3
CO3	Construct and apply fundamental system software components, and understand assembler, macro processor, loader, linker, and related tools.	PO1,PO2,PO4
CO4	Identify and describe compilers, interpreters, and other system programming tools, and understand the phases of compilation.	PO1,PO2,PO3, PO4
CO5	Analyze real-time applications of operating systems and evaluate future trends, challenges, and societal impacts of system software.	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. Operating System Concepts (9th or 10th Edition) by Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne in publisher: Wiley
2. Operating Systems: A Concept-Based Approach (3rd Edition) by D. M. Dhamdhere publisher: McGraw Hill

REFERENCE BOOKS:

1. Real-Time Systems: Theory and Practice by Rajib Mall, Publisher: Pearson
2. System Software: An Introduction to Systems Programming (3rd Edition) by Leland L. Beck & D. Manjula, Publisher: Pearson.

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech.- II Semester

23CSM365L

DEEP LEARNING LAB
(PROFESSIONAL CORE)

L T P C
- - 3 1.5

PRE-REQUISITES: Machine Learning

COURSE EDUCATIONAL OBJECTIVES:

1. To provide hands-on experience in implementing Natural Language Processing (NLP) and Deep Learning (DL) techniques using real-world datasets.
2. To understand and apply text pre-processing, tokenization, word embeddings, and sequence modelling techniques.
3. To build and evaluate NLP models such as RNNs, LSTMs, GRUs, Transformers, and pre-trained language models.
4. To familiarize students with tools and libraries such as NLTK, spaCy, TensorFlow, PyTorch, and Hugging Face.
5. To enable learners to design, train, fine-tune, and deploy deep learning models for NLP applications.

LIST OF LAB EXPERIMENTS:

1. Text Preprocessing: Implement tokenization, stopword removal, stemming, and lemmatization using NLTK and spaCy.
2. Part-of-Speech Tagging & Named Entity Recognition: Use NLTK or spaCy to perform POS tagging and NER on news articles.
3. Text Vectorization: Implement Bag-of-Words, TF-IDF, and Word2Vec/GloVe embeddings for given datasets.
4. Sentiment Analysis: Train a basic feedforward neural network using TensorFlow/Keras or PyTorch for binary sentiment classification.
5. Sequence Modeling with RNNs: Build an RNN model for next word prediction or text generation using movie scripts or news data.
6. LSTM-Based Text Classification: Develop an LSTM model for multi-class classification (e.g., Amazon reviews).
7. Named Entity Recognition using Bi-LSTM + CRF: Implement a sequence tagging model for NER using deep learning.
8. Text Summarization using Seq2Seq: Implement an encoder-decoder architecture for extractive or abstractive summarization.
9. Machine Translation: Use an attention-based encoder-decoder model to perform translation (e.g., English to French).
10. Fine-Tuning Transformer Models: Use Hugging Face Transformers to fine-tune BERT or DistilBERT for text classification.
11. Question Answering System: Implement a QA model using pre-trained transformer models like BERT or T5.
12. NLP Model Deployment: Deploy a trained NLP model as a REST API using Flask or FastAPI.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Implement basic NLP tasks such as tokenization, stemming, lemmatization, and POS tagging.	PO1
CO2	Preprocess and vectorize text data using classical and modern techniques including TF-IDF and word embeddings.	PO2

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CO3	Build deep learning-based NLP models using RNNs, LSTMs, GRUs, and attention mechanisms.	PO3
CO4	Fine-tune transformer models like BERT, RoBERTa, and GPT for text classification, QA, and NER.	PO4
CO5	Utilize the modern tool while doing the exercises.	PO5
CO6	Follow the ethical principles while doing the exercises.	PO8
CO7	Do the exercises effectively as an individual and as a team member in a group	PO9
CO8	Communicate verbally among team members and in written form, the understanding about the trade exercises.	PO10
CO9	Continue updating their skill related to trades.	PO12

TEXT BOOKS:

1. Jurafsky, D. & Martin, J. H., Speech and Language Processing, Pearson, 3rd Edition Draft,2025.
2. Yoav Goldberg, Neural Network Methods in Natural Language Processing, Morgan & Claypool, Morgan & Claypool,2017.
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.

REFERENCE BOOKS:

1. Tom Young, Devamanyu Hazarika, Recent Trends in Deep Learning Based NLP, Springer,2017.
2. Delip Rao, Brian McMahan, Natural Language Processing with PyTorch, O'Reilly,2019.
3. Lewis Tunstall, Leandro von Werra, Thomas Wolf, Natural Language Processing with Transformers, O'Reilly, 2022.

ONLINE COURSES:

1. Coursera – Natural Language Processing Specialization (DeepLearning.AI)
2. Udemey – NLP with Deep Learning in Python (Part 1 & 2)

CO-PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech.- II Semester

23CSE357L

**OPERATING SYSTEMS & SYSTEMS
PROGRAMMING LAB**

**L T P C
- - 3 1.5**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide students with a strong foundation in the principles, architecture, and functioning of operating systems, including process management, memory management, file systems, and I/O operations.
2. To familiarize students with system programming concepts, enabling them to work with assemblers, loaders, linkers, compilers, interpreters, and system-level tools.
3. To develop practical skills in implementing operating system functionalities and system software components, using appropriate programming environments and tools.
4. To enable students to analyze and evaluate modern operating systems, understand real-time OS requirements, and explore current trends, challenges, and advancements in system software.

LIST OF EXPERIMENTS

1. Simulate the following CPU scheduling algorithm FCFS
2. Simulate the following CPU scheduling algorithm SJF
3. Simulate the following CPU scheduling algorithm Priority
4. Simulate the following CPU scheduling algorithm Round Robin
5. Write a program to illustrate concurrent execution of threads using pthreads library.
6. Write a program to solve producer-consumer problem using Semaphores.
7. Implement Bankers Algorithm for Dead Lock avoidance and prevention.
8. Design and implement a two-pass assembler in C.
9. Implement a Macro Processor using C for assembly language programs.
10. Develop a simple Linux Shell (command interpreter) using C.
11. Write shell scripts for file operations, process creation, and monitoring.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Implement basic process management operations such as process creation, termination, inter-process communication, and synchronization using system calls.	PO1
CO2	Develop programs to demonstrate memory management techniques including paging, segmentation, and allocation strategies.	PO2
CO3	Implement file system operations such as file handling, directory structures, and disk scheduling techniques.	PO3
CO4	Apply system programming concepts by writing programs for assemblers, macro processors, linkers, and loaders.	PO4

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

LAB SOFTWARE REQUIREMENTS:

- **Languages/Tools:** C, C++, Assembly Language
- **Platforms:** Linux, VS code, Notepad ++

CO-PO MAPPING:

CO \ P O	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO*	3	3	3	3	3	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech.- II Semester

23HSM241L

SOFTSKILLS LAB

L	T	P	C
1	0	2	2

COURSE EDUCATIONAL OBJECTIVES:

1. To encourage all round development of the students by focusing on soft skills
2. To make the students aware of critical thinking and problem-solving skills
3. To develop leadership skills and organizational skills through group activities
4. To function effectively with heterogeneous teams

UNIT – I SOFT SKILLS & COMMUNICATION SKILLS (9)

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills- Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity (The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)
Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches-convincing- negotiating- agreeing and disagreeing with professional grace. Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT – II CRITICAL THINKING (9)

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT – III PROBLEM SOLVING & DECISION MAKING (9)

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT – IV EMOTIONAL INTELLIGENCE & STRESS MANAGEMENT (9)

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self- Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

UNIT – V LEADERSHIP SKILLS

(9)

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk Taking - Team Building - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc. **NOTE-:** The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.

Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the importance of soft skills and demonstrate effective intrapersonal communication, including self-expression, clarity of thought, and personal articulation.	PO1
CO2	Demonstrate interpersonal communication skills through group discussions, debates, and collaborative tasks in a professional setting.	PO2
CO3	Exhibit verbal communication skills such as public speaking, oral presentations, extempore, and persuasive speaking with professional etiquette.	PO3
CO4	Identify and interpret non-verbal communication cues through mock interviews, presentations, and observational activities.	PO5
CO5	Apply critical thinking skills such as observation, analysis, curiosity, and creativity to evaluate and respond to real-world scenarios.	PO8
CO6	Solve problems and make decisions effectively by managing conflicts, exploring alternatives, and selecting appropriate solutions through group discussions and case studies.	PO9
CO7	Develop emotional intelligence by practicing self-awareness, empathy, emotional regulation, and stress management techniques.	PO10
CO8	Demonstrate leadership abilities such as team-building, time management, accountability, and motivational speaking in individual and group activities.	PO12

TEXT BOOKS:

1. Personality Development and Soft Skills (English, Paperback, MitraBarunK.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr ShikhaKapoorPublisher : I K International Publishing House; 0 edition (February 28, 2018)

REFERENCE BOOKS:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr.Usha Jain Publisher: Vayu Education of India

REFERENCE WEBSITE:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCyvXh0E_y-bOO1_g
2. https://youtu.be/xBaLqJZ0t6A?list=PLzf4HHIsQFwJZel_j2PUy0pwjVUgj7KIJ
3. <https://youtu.be/-Y-R9hDI7IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>

CO-PO MAPPING

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

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech.- II Semester

23ESC352L

TINKERING LAB

L T P C
0 0 3 1.5

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Encourage Innovation and Creativity
2. Provide Hands-on Learning and Impart Skill Development
3. Foster Collaboration and Teamwork
4. Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5. Import Problem-Solving mind-set

LIST OF EXPERIMENTS: (Any nine experiments shall be done)

1. Make your own parallel and series circuits using breadboard for any application of your choice.
2. Design and 3D print a Walking Robot
3. Design and 3D Print a Rocket.
4. Temperature & Humidity Monitoring System (DHT11 + LCD)
5. Water Level Detection and Alert System
6. Automatic Plant Watering System
7. Bluetooth-Based Door Lock System
8. Smart Dustbin Using Ultrasonic Sensor
9. Fire Detection and Alarm System
10. RFID-Based Attendance System
11. Voice-Controlled Devices via Google Assistant
12. Heart Rate Monitoring Using Pulse Sensor
13. Soil Moisture-Based Irrigation
14. Smart Helmet for Accident Detection
15. Milk Adulteration Detection System
16. Water Purification via Activated Carbon
17. Solar Dehydrator for Food Drying
18. Temperature-Controlled Chemical Reactor
19. Ethanol Mini-Plant Using Biomass
20. Smart Fluid Flow Control (Solenoid + pH Sensor)
21. Portable Water Quality Tester
22. AI Crop Disease Detection
23. AI-based Smart Irrigation
24. ECG Signal Acquisition and Plotting
25. AI-Powered Traffic Flow Prediction
26. Smart Grid Simulation with Load Monitoring
27. Smart Campus Indoor Navigator
28. Weather Station Prototype
29. Firefighting Robot with Sensor Guidance

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

30. Facial Recognition Dustbin
31. Barcode-Based Lab Inventory System
32. Growth Chamber for Plants
33. Biomedical Waste Alert System
34. Soil Classification with AI
35. Smart Railway Gate
36. Smart Bin Locator via GPS and Load Sensors
37. Algae-Based Water Purifier
38. Contactless Attendance via Face Recognition

Note: The students can also design and implement their own ideas, apart from the list of experiments mentioned above.

Note: A minimum of 8 to 10 experiments must be completed by the students.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Design electronic circuits for variety of applications using series and parallel connections	PO1
CO2	Analyze and solve real time problems using Arduino boards	PO2
CO3	Design and analyze a real time circuit using Tinkercad	PO3
CO4	Simulate and interface actuators using Arduino boards	PO4
CO5	Able to use modern simulation tools for interfacing the hardware components.	PO5
CO6	Follow ethical principles in designing, simulating and implementing various circuits.	PO8
CO7	Do experiments effectively as an individual and as a member in a group.	PO9
CO8	Communicate verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue updating their skill related to semiconductors implementation for various application during their life time	PO12

23CAI363A

**III B.Tech. - II Semester
BLOCKCHAIN FOR AI
(Professional Elective-II)**

**L T P C
3 - - 3**

COURSE OBJECTIVES:

1. To understand the foundational concepts of blockchain technology and its architecture.
2. To explore smart contracts, consensus algorithms, and distributed ledger technology.
3. To investigate the integration of AI with blockchain for secure, decentralized applications.
4. To develop blockchain-enabled AI solutions for real-world use cases.
5. To understand the ethical, security, and scalability challenges in Blockchain-AI ecosystems.

UNIT I: BLOCKCHAIN FUNDAMENTALS AND ARCHITECTURE (9)

Introduction to Blockchain Technology, Components: Blocks, Hashing, Merkle Trees, Types of Blockchains: Public, Private, Consortium, Distributed Ledger Technology (DLT) and P2P Networks, Blockchain Structure and Mining, Use Cases and Evolution of Blockchain.

UNIT II: SMART CONTRACTS AND CONSENSUS MECHANISMS (9)

Smart Contracts: Definition, Features, Use Cases, Ethereum and Solidity Basics, Consensus Algorithms: PoW, PoS, DPoS, PBFT, Gas, Transactions, and Events in Ethereum, Hyperledger Fabric: Architecture and Chaincode, Deployment and Testing of Smart Contracts.

UNIT III: INTEGRATION OF BLOCKCHAIN AND AI (9)

Motivation for Integrating Blockchain with AI, Decentralized AI Models and Federated Learning, Secure Model Sharing and Provenance, Blockchain for Data Integrity in AI Systems, AI for Blockchain (e.g., optimizing consensus), Case Study: Decentralized AI Marketplace.

UNIT IV: APPLICATIONS OF BLOCKCHAIN IN AI SYSTEMS (9)

Blockchain for Explainable and Trusted AI, Applications in Healthcare and Genomics, Blockchain for Autonomous Vehicles and IoT, Financial AI Systems with Smart Contracts, Supply Chain and Logistics Intelligence, NFT-based AI Applications (Digital Identity, IP).

UNIT V: SECURITY, PRIVACY AND CHALLENGES IN BLOCKCHAIN-AI (9)

Security Challenges: Sybil Attacks, 51% Attacks, Privacy Preservation and Zero Knowledge Proofs, Scalability and Energy Concerns in Blockchain-AI, Ethical and Legal Concerns in AI with Blockchain, Interoperability of Blockchain Platforms, Future Trends: Quantum-Resistant Blockchain- AI.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course the student will be to		POs related to COs
CO1	Explain the fundamentals of blockchain and its components.	PO1,PO2
CO2	Analyze the role of consensus mechanisms in maintaining trust and decentralization.	PO1,PO3
CO3	Apply blockchain for secure data sharing in AI systems.	PO1,PO2,PO4
CO4	Develop and deploy smart contracts using Ethereum/Solidity.	PO1,PO2,PO3, PO4
CO5	Evaluate blockchain-based AI applications in healthcare, finance, and supply chains.	PO1,PO2,PO4, PO5

TEXTBOOKS:

1. Imran Bashir, Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications, Packt, 2020.
2. Melanie Swan, Blockchain: Blueprint for a New Economy, O'Reilly Media, 2015.
3. Joseph Holbrook, Architecting AI Solutions on Blockchain, Packt Publishing, 2020.

REFERENCE BOOKS:

1. Arshdeep Bahga, Vijay Madiseti, Blockchain Applications: A Hands-On Approach, VPT, 2017.
2. Karamjit Singh, Blockchain for AI: Use Cases and Implementation, Springer, 2023.
3. Roger Wattenhofer, The Science of the Blockchain, 2016.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech. - II Semester

23CAI363B	Graph Neural Networks (Professional Elective-II)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the fundamentals of graph theory and graph-structured data.
- To explore the concepts of neural networks extended to non-Euclidean domains.
- To understand architectures and algorithms behind various types of GNNs.
- To apply GNN models in real-world applications such as recommendation, social networks, and bioinformatics.
- To enable students to build and evaluate GNN models using frameworks like PyTorch Geometric and DGL.

UNIT I: FUNDAMENTALS OF GRAPH THEORY AND MACHINE LEARNING ON GRAPHS (9)

Introduction to Graphs: Nodes, Edges, Adjacency Matrix, Types of Graphs: Directed, Undirected, Weighted, Bipartite, Graph Traversal Algorithms (BFS, DFS), Graph Representations for ML (Adjacency List, Matrix, Laplacian), Node, Edge, and Graph-level Prediction Problems, Motivation and Challenges for Learning on Graphs.

UNIT II: SPECTRAL AND SPATIAL METHODS FOR GRAPH LEARNING (9)

Spectral Graph Theory Basics, Graph Convolution via Spectral Methods, Chebyshev and First-order Approximations, Spatial Graph Convolutions, Comparison of Spectral vs Spatial GNNs, Graph Laplacian and Eigenvalue Properties.

UNIT III: GRAPH NEURAL NETWORK ARCHITECTURES (9)

Graph Convolutional Networks (GCNs), Graph Attention Networks (GATs), GraphSAGE: Sampling and Aggregation, Graph Isomorphism Networks (GIN), Message Passing Neural Networks (MPNNs), Inductive vs Transductive GNN Learning

UNIT IV: APPLICATIONS OF GNNs (9)

Node Classification (e.g., Cora, Citeseer), Link Prediction (e.g., Recommender Systems), Graph Classification (e.g., Molecule Property Prediction), Traffic Forecasting and Social Network Modeling, GNNs in Healthcare and Bioinformatics, Explainability and Interpretability in GNNs.

UNIT V: IMPLEMENTATION, OPTIMIZATION, AND RECENT ADVANCES (9)

Overview of PyTorch Geometric and DGL, Data Loading and Preprocessing for Graph Datasets, Model Training, Loss Functions, and Evaluation Metrics, Hyperparameter Tuning in GNNs, Recent Research Trends and Architectures (e.g., Heterogeneous GNNs, Graph Transformers), Challenges and Future Directions in GNNs.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the basics of graph structures and their significance in machine learning.	PO1,PO2
CO2	Learn and implement different types of GNN architectures.	PO1,PO3
CO3	Apply GNNs to real-world structured data problems.	PO1,PO2,PO4
CO4	Use modern libraries and tools to train and evaluate GNNs.	PO1,PO2,PO3, PO4
CO5	Analyze the effectiveness and limitations of GNNs in different domains.	PO1,PO2,PO4, PO5

TEXTBOOKS:

1. Zonghan Wu, Shirui Pan, Fengwen Chen, Guodong Long, Chengqi Zhang, Philip S. Yu, A Comprehensive Survey on Graph Neural Networks, IEEE Transactions on Neural Networks and Learning Systems, 2021.
2. Yao Ma, Jiliang Tang, Deep Learning on Graphs, Cambridge University Press, 2021.
3. William L. Hamilton, Graph Representation Learning, Morgan & Claypool Publishers, 2020.

REFERENCE BOOKS:

1. Barrett, Jure Leskovec, Mining of Massive Datasets, Cambridge University Press.
2. Thomas Kipf, GCN and related papers and tutorials (arXiv).
3. Petar Veličković, Graph Attention Networks (original paper and slides).
4. Michael Bronstein et al., Geometric Deep Learning: Grids, Groups, Graphs, Geodesics, and Gauges (arXiv preprint).

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech. - II Semester

23CSD361T

PREDICTIVE ANALYTICS
(Professional Elective-II)

L	T	P	C
3	0	0	3

PRE-REQUISITES:NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Discuss the concept Predictive Analytics
2. Illustrate the uses and applications of Predictive Analytics
3. Demonstrate building of Predictive Analytics models

UNIT -I:

(9)

Overview of Predictive Analytics: What Is Analytics? What Is Predictive Analytics? Business Intelligence Predictive Analytics vs. Business Intelligence, Predictive Analytics vs. Statistics, Predictive Analytics vs. Data Mining, Who Uses Predictive Analytics? Challenges in Using Predictive Analytics, What Educational Background Is Needed to Become a Predictive Modeler?

Setting Up the Problem: Predictive Analytics Processing Steps: CRISP-DM, Business Understanding, Defining Data for Predictive Modelling, Defining the Target Variable, Defining Measures of Success for Predictive Models, Doing Predictive Modelling Out of Order, Case study- Recovering Lapsed Donors, Fraud Detection

UNIT-II:

(9)

Data Understanding: What the Data Looks Like, Single Variable Summaries, Data Visualization in One Dimension, Histograms, Multiple Variable Summaries, Data Visualization, Two or Higher Dimensions, The Value of Statistical Significance, Pulling It All Together into a Data Audit.

Data Preparation: Variable Cleaning, Feature Creation.

UNIT-III:

(9)

Item sets and Association Rules: Terminology, Parameter Settings, How the Data Is Organized, Measures of Interesting Rules, Deploying Association Rules, Problems with Association Rules, Building Classification Rules from Association Rules. **Descriptive Modelling:** Data Preparation Issues with Descriptive Modelling, Principal Component Analysis, Clustering Algorithms. Interpreting Descriptive Models: Standard Cluster Model Interpretation.

UNIT-IV:

(9)

Predictive Modelling: Decision Trees, Logistic Regression, Neural Networks, K- Nearest Neighbour, Naïve Bayes, Regression Models, Linear Regression, Other Regression Algorithms. Assessing Predictive Models: Batch Approach to Model Assessment, Assessing Regression Models.

UNIT-V:

(9)

Model Ensembles: Motivation for Ensembles, Bagging, Boosting, Improvements to Bagging and Boosting, Model Ensembles and Occam's Razor, Interpreting Model Ensembles.

Text Mining: Motivation for Text Mining, A Predictive Modelling Approach to Text Mining, structured vs. Unstructured Data, Why Text Mining Is Hard, Data Preparation Steps, Text Mining Features, Modelling with Text Mining Features, Regular Expressions.

Model Deployment: General Deployment Considerations.

Case Studies: Survey Analysis Case Study, Help Desk Case Study.

Total Hours:45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Visualize and explore data to better understand relationships among variables	PO1, PO2
CO2	Understand how ensemble models improve predictions	PO2, PO3
CO3	Organize the predictive modelling task and data flow	PO2, PO4
CO4	Apply predictive models to generate predictions for new data	PO2, PO3, PO4
CO5	Choose and implement appropriate performance measures for predictive models	PO3, PO5

TEXT BOOKS:

1. Dean Abbott, Applied Predictive Analytics, Published by Jhon Wiley & Sons, Inc, 2014.

REFERENCE BOOKS:

1. Eric Siegel, Predictive Analytics, Published by Jhon Wiley & Sons, inc, 2013.
2. Data Analytics using Python Kindle Edition by Bharti Motwani, 2020.

REFERENCE WEBSITE:

1. Predictive Analytics: Introduction to Business Forecasting | Udemy

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	3	-	-	-	-	-	-	-	-	-
CO.3	-	3	-	3	-	-	-	-	-	-	-	-
CO.4	-	3	3	3	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	3	-	-	-	-	-	-	-
CO*	3	3	3	3	3	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - II Semester

SUBJECT CODE
23CSM362A

**RECOMMENDER SYSTEMS
(PROFESSIONAL ELECTIVE-II)**

L T P C
3 0 0 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

- To introduce the fundamentals of graph theory and graph-structured data.
- To explore the concepts of neural networks extended to non-Euclidean domains.
- To understand architectures and algorithms behind various types of GNNs.
- To apply GNN models in real-world applications such as recommendation, social networks, and bioinformatics.
- To enable students to build and evaluate GNN models using frameworks like PyTorch Geometric and DGL

UNIT I: FUNDAMENTALS OF GRAPH THEORY AND MACHINE LEARNING ON GRAPHS (9)

Introduction to Graphs: Nodes, Edges, Adjacency Matrix, Types of Graphs: Directed, Undirected, Weighted, Bipartite, Graph Traversal Algorithms (BFS, DFS), Graph Representations for ML (Adjacency List, Matrix, Laplacian), Node, Edge, and Graph-level Prediction Problems, Motivation and Challenges for Learning on Graphs.

UNIT II: SPECTRAL AND SPATIAL METHODS FOR GRAPH LEARNING (9)

Spectral Graph Theory Basics, Graph Convolution via Spectral Methods, Chebyshev and First-order Approximations, Spatial Graph Convolutions, Comparison of Spectral vs Spatial GNNs, Graph Laplacian and Eigenvalue Properties.

UNIT III: GRAPH NEURAL NETWORK ARCHITECTURES (9)

Graph Convolutional Networks (GCNs), Graph Attention Networks (GATs), GraphSAGE: Sampling and Aggregation, Graph Isomorphism Networks (GIN), Message Passing Neural Networks (MPNNs), Inductive vs Transductive GNN Learning.

UNIT IV: APPLICATIONS OF GNN's (9)

Node Classification (e.g., Cora, Citeseer), Link Prediction (e.g., Recommender Systems), Graph Classification (e.g., Molecule Property Prediction), Traffic Forecasting and Social Network Modeling, GNNs in Healthcare and Bioinformatics, Explainability and Interpretability in GNNs.

UNIT V: IMPLEMENTATION, OPTIMIZATION, AND RECENT Advances (9)

Overview of PyTorch Geometric and DGL, Data Loading and Preprocessing for Graph Datasets, Model Training, Loss Functions, and Evaluation Metrics, Hyperparameter Tuning in GNNs, Recent Research Trends and Architectures (e.g., Heterogeneous GNNs, Graph Transformers), Challenges and Future Directions in GNNs.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the basics of graph structures and their significance in machine learning.	PO1, PO2, PO3, PO4
CO2	Learn and implement different types of GNN architectures.	PO1, PO2, PO3, PO4

III B.Tech. - II Semester

23CAI364A

**AI FOR FINANCE
(PROFESSIONAL ELECTIVE-III)**

**L T P C
3 0 0 3**

COURSE OBJECTIVES:

- To introduce the role of Artificial Intelligence (AI) in financial applications and decision- making.
- To understand financial data types, sources, and processing methods.
- To apply machine learning and deep learning models in various finance sectors.
- To analyze risk, fraud detection, credit scoring, and portfolio management using AI.
- To evaluate ethical and regulatory challenges in AI-enabled finance.

UNIT I: INTRODUCTION TO FINANCE AND AI APPLICATIONS (9)

Introduction to Financial Markets and Instruments, Overview of AI Techniques in Finance, Types of Financial Data: Market, Transactional, Customer, Financial Statements and Key Indicators, AI Use Cases in Banking, Insurance, and Investment, FinTech and the Rise of Robo-Advisors.

UNIT II: MACHINE LEARNING IN FINANCE (9)

Supervised Learning for Credit Scoring, Unsupervised Learning for Customer Segmentation, Feature Engineering for Financial Data, Handling Imbalanced Datasets in Fraud Detection, Time Series Forecasting with Regression and ARIMA, Model Validation and Backtesting in Finance.

UNIT III: DEEP LEARNING AND NLP IN FINANCE (9)

Introduction to Deep Learning for Finance, Stock Price Prediction using LSTM and RNNs, Sentiment Analysis from Financial News and Tweets, NLP for Document Classification: Earnings Reports, Chatbots and Virtual Assistants in Banking, Reinforcement Learning for Portfolio Optimization.

UNIT IV: AI-DRIVEN FINANCIAL APPLICATIONS (9)

Fraud Detection Systems using ML and DL, Credit Risk and Loan Default Prediction, AI in Algorithmic and High-Frequency Trading, Robo-Advisors: Architecture and Optimization, Blockchain and AI Integration for Financial Security, Case Studies: AI in Wealth Management & Insurance.

UNIT V: ETHICS, REGULATION, AND FUTURE OF AI IN FINANCE (9)

Regulatory Frameworks in AI-based Finance, Explainability and Interpretability of Financial Models, Ethical Issues: Bias, Fairness, Transparency, Data Privacy and GDPR in Financial AI, Responsible AI Practices in Finance, Emerging Trends: Quantum AI, Decentralized Finance (DeFi).

Total Hours:45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Describe the fundamentals of AI techniques applicable to finance.	PO1,PO2
CO2	Analyze financial time series data using AI-based models.	PO1,PO3
CO3	Apply machine learning for fraud detection and credit risk analysis.	PO1,PO2,PO4
CO4	Build predictive models for stock prices, trading, and customer segmentation.	PO1,PO2,PO3, PO4
CO5	Evaluate the limitations and ethical implications of AI in financial systems.	PO1,PO2,PO4, PO5

TEXTBOOKS:

1. Yves Hilpisch, Artificial Intelligence in Finance: A Python-Based Guide, O'Reilly, 2020.
2. Yves Hilpisch, Python for Finance: Mastering Data-Driven Finance, O'Reilly, 2018.
3. Markus Loecher, Machine Learning for Finance, Packt Publishing, 2021.

REFERENCE BOOKS:

1. A. W. Lo, The Evolution of Technical Analysis, Wiley Finance, 2010.
2. Tony Guida, Big Data and Machine Learning in Quantitative Investment, Wiley, 2019.
3. Tucker Balch, AI for Trading – Georgia Tech Specialization, Coursera.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B.Tech. - II Semester

23CSD362A

**SOCIAL NETWORK ANALYSIS
(PROFESSIONAL ELECTIVE-III)**

**L T P C
3 0 0 3**

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

- Discuss the characteristics of different social networks
- Demonstrate the functioning of different social networks

UNIT -1 : (9)

Hacking on Twitter data , Micro formats : Semantic Mark up and common sense collide

UNIT - 2 : (9)

Mailboxes : Oldies but Goodies , Titter : Friends , Followers and Setwise operations

UNIT - 3: (9)

Twitter : The Tweet , the Whole Tweet , and Nothing but the Tweet

UNIT - 4: (9)

LinkedIn : Clustering your professional network for Fun (andprofit)

UNIT - 5: (9)

Facebook : The All-in-one Wonder

Total Hours:45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the structure and semantics of microformats and how semantic markup enhances data interpretation in social media.	PO1, PO2
CO2	Analyze and manipulate mail box data and apply set-wise operations on social media networks such as Twitter.	PO1, PO3
CO3	Evaluate and extract insights from tweet-level data, understanding content structure and meta data for sentiment Or trend analysis.	PO1, PO3,PO5
CO4	Apply clustering techniques to LinkedIn data to discover community structures and professional network patterns.	PO1, PO2, PO3, PO5
CO5	Explore and integrate multiple data types from Facebook to derive unified user profiles and social behavior analytics.	PO1, PO3, P04, PO5

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

TEXT BOOKS:

1. MatthewA.Russel, MiningtheSocialWeb, O'Reilly, 2013

REFERENCE BOOKS:

1. Social Network Analysis: A Introduction with an Extensive Implementation to a Large Scale Online Network using Pajek, SeifedineKadry, Mohammed Taie, 2014.
2. An Introduction to Social Network Data Analytics ,Charu C .Aggarwal, IBMT .J.Watson Research Center.

REFERENCE WEBSITE:

1. Social Network Analysis| Coursera

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	3	-	-	-	-	-	-	-
CO.4	3	3	3	-	3	-	-	-	-	-	-	-
CO.5	3	-	3	2	3	-	-	-	-	-	-	-
CO*	3	2	2.8	2	3	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B.Tech. - VI Semester

23CSM363B

EDGE COMPUTING
(PROFESSIONAL ELECTIVE-III)

L	T	P	C
3	-	-	3

PRE-REQUISITES: AI Fundamentals

COURSE EDUCATIONAL OBJECTIVES:

1. Introduce students to the fundamentals and applications of Edge Computing and how AI is integrated at the edge.
2. Enable learners to understand the design, deployment of AI models on edge devices.
3. Familiarize students with energy-efficient, latency-aware, and privacy-preserving AI systems in edge environments.
4. Equip students with hands-on skills in frameworks, tools, and platforms that support edge-based AI deployments.
5. Address challenges like model compression, edge-cloud collaboration, and inference acceleration at the edge.

UNIT-I: INTRODUCTION TO EDGE COMPUTING AND AI (9)

Evolution of Computing Paradigms: Cloud, Fog, and Edge, Introduction to Edge AI – Concepts and Motivation, Architecture of Edge Computing Systems, Differences between Edge AI and Cloud AI, Use Cases of Edge AI – Smart Cities, Healthcare, IoT, and Industry 4.0, Hardware for Edge AI –Edge GPUs, TPUs, FPGAs, Types of Edge Devices – Raspberry Pi, Jetson Nano, Coral, Challenges in Deploying AI on Edge Dead locks: Definition, Characteristics, Prevention, Avoidance, Detection and Recovery.

UNIT-II: AI MODELS AND EDGE INFERENCE (9)

Types of AI Models Suitable for Edge Deployment, Model Optimization Techniques: Quantization, Pruning, Distillation, Transfer Learning for Edge AI, Inference Acceleration using Edge Hardware, Lightweight Models: Mobile Net, Squeeze Net, Tiny ML, Frameworks for Edge Deployment: Tensor Flow Lite, ONNX, Open VINO, Compilation Tools: TVM, Glow, Energy and Latency-aware Inference.

UNIT-III: EDGE-CENTRIC ARCHITECTURES AND DATA MANAGEMENT (9)

Distributed AI Architectures: Edge, Fog, and Cloud, Collaborative Intelligence – Edge-Cloud of floating Strategies, Data Lifecycle in Edge AI Systems, Real-time Stream Processing at the Edge, Data Compression and Fusion Techniques, Caching and Scheduling Mechanisms, Privacy-Preserving Edge AI (Federated Learning, Differential Privacy), Case Study: Real-time Video Analytics using Edge Devices.

UNIT-IV: SECURITY, PRIVACY, AND ETHICAL ASPECTS OF AI AT THE EDGE (9)

Security Threats in Edge Environments, Privacy Concerns with AI Inference on Personal Devices, Federated Learning: Concepts and Frameworks (e.g., Flower, Tensor Flow Federated), Data Anonymization and Encryption Techniques, Blockchain for Secure Edge AI, Explainable AI for Edge Decisions, Regulations and Ethical Challenges in Edge AI, Case Studies on Privacy-Aware AI Systems.

UNIT-V: APPLICATIONS AND FUTURE TRENDS IN EDGE AI (9)

Edge AI in Autonomous Vehicles, Industrial Automation and Predictive Maintenance, AI- driven Surveillance and Smart Homes, Edge AI in Healthcare Monitoring Systems, 5G and Edge AI Integration, Emerging Trends: TinyML, Neuromorphic Computing, Benchmarking Tools for Edge AI Performance, Future Research Directions and Innovation Opportunities.

Total Hours: 45

III B.Tech. - VI Semester

23CSM363C

**QUANTUM COMPUTING
(PROFESSIONAL ELECTIVE-III)**

**L T P C
3 - - 3**

PRE-REQUISITES: Quantum Mechanics and Quantum physics

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the principles and mathematical foundations of quantum computation.
2. To understand quantum gates, circuits, and computation models.
3. To explore quantum algorithms and their advantages over classical ones.
4. To develop the ability to simulate and write basic quantum programs.
5. To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.

UNIT I: FUNDAMENTALS OF QUANTUM MECHANICS AND LINEAR ALGEBRA

(9)

Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation, Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT II: QUANTUM GATES AND CIRCUITS

(9)

Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility, Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT III: QUANTUM ALGORITHMS AND COMPLEXITY

(9)

Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover's Search Algorithm, Shor's Factoring Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT IV: QUANTUM PROGRAMMING AND SIMULATION PLATFORM

(9)

Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Results, Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State of Quantum Hardware.

UNIT V: Applications and Future of Quantum Computing

(9)

Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum Technologies, Future Trends and Research Directions.

Total Hours: 45

23CSM363D

**III B.Tech.- VI Semester
REINFORCEMENT LEARNING
(Professional Elective-III)**

**L T P C
3 0 0 3**

PRE-REQUISITES: Machine Learning Fundamentals

COURSE EDUCATIONAL OBJECTIVES:

1. To learn RL task formulation (action space, state space, environment definition)
2. To learn Tabular based solutions (dynamic programming, Monte Carlo, temporal-difference)
3. To learn Function approximation solutions (Deep Q-networks)
4. To learn Policy gradient from basic (REINFORCE) towards advanced topics (proximal policy optimization, deep deterministic policy gradient, etc.)
5. To learn Model-based reinforcement learning

UNIT-I: INTRODUCTION TO ML AND PROBABILITY (9)

Introduction: Course logistics and overview. Origin and history of Reinforcement Learning research. Its connections with other related fields and with different branches of machine learning.

Probability Primer: Brush up of Probability concepts - Axioms of probability, concepts of random variables, PMF, PDFs, CDFs, Expectation. Concepts of joint and multiple random variables, joint, conditional and marginal distributions. Correlation and independence.

UNIT-II: PREDICTION AND DYNAMIC PROGRAMMING (9)

Markov Decision Process: Introduction to RL terminology, Markov property, Markov chains, Markov reward process (MRP). Introduction to and proof of Bellman equations for MRPs along with proof of existence of solution to Bellman equations in MRP. Introduction to Markov decision process (MDP), state and action value functions, Bellman expectation equations, optimality of value functions and policies, Bellman optimality equations.

Prediction and Control by Dynamic Programming: Overview of dynamic programming for MDP, definition and formulation of planning in MDPs, principle of optimality, iterative policy evaluation, policy iteration, value iteration, Banach fixed point theorem, proof of contraction mapping property of Bellman expectation and optimality operators, proof of convergence of policy evaluation and value iteration algorithms, DP extensions.

UNIT-III: PREDICTION AND CONTROL (9)

Monte Carlo Methods for Model Free Prediction and Control: Overview of Monte Carlo methods for model free RL, First visit and every visit Monte Carlo, Monte Carlo control, On policy and off policy learning, Importance sampling.

TD Methods: Incremental Monte Carlo Methods for Model Free Prediction, Overview TD(0), TD(1) and TD(λ), k step estimators, unified view of DP, MC and TD evaluation methods, TD Control methods - SARSA, Q-Learning and their variants.

UNIT: IV: ALGORITHMS FOR FUNCTION CONTROL (9)

Function Approximation Methods: Getting started with the function approximation methods, Revisiting risk minimization, gradient descent from Machine Learning, Gradient MC and Semi-gradient TD(0) algorithms, Eligibility trace for function approximation, After states, Control with function approximation, Least squares, Experience replay in deep Q-Networks.

UNIT - V: (9)

Policy Gradients: Getting started with policy gradient methods, Log-derivative trick, Naive REINFORCE algorithm, bias and variance in Reinforcement Learning, Reducing variance in policy gradient estimates, baselines, advantage function, actor-critic methods.

TotalHours:45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

23OCE361A

DISASTER MANAGEMENT (OE – II)

L T P C

3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. **To understand** the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.
2. **To analyze** the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.
3. **To apply** wind engineering principles and computational techniques in designing wind-resistant structures.
4. **To evaluate** earthquake effects on buildings and develop strategies for seismic retrofitting.
5. **To assess** seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.

UNIT- I

(9)

Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters in different Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT- II

(9)

Cyclones and Their Impact– Climate Change and Its Impact On Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.

UNIT- III

(9)

Wind Engineering and Structural Response– Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD). General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects On Buildings, towers, Glass Panels, Etc., and Wind-Resistant Features in Design. Coda Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas. Innovative Construction Materials and Techniques, Traditional Construction Techniques in Coastal Areas.

UNIT-IV

(9)

Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicenter, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides. Performance of Ground and Buildings in Past Earthquakes– Behavior of Various Types of Buildings and Structures, Collapse Patterns; Behavior of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies. Seismic Retrofitting– Weaknesses Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.

UNIT- V

(9)

Planning and Design Considerations for Seismic Safety– General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

Distribution, Soft Story Effects, Etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks. Construction Details– Various Types of Foundations, Soil Stabilization, Retaining Walls, Plinth Fill, Flooring, Walls, Openings, Roofs, Terraces, Parapets, Boundary Walls, Underground and Overhead Tanks, Staircases, and Isolation of Structures. Innovative Construction Materials and Techniques. Local Practices– Traditional Regional Responses. Computational Investigation Techniques.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.	PO1,PO6,PO8, PO9
CO2	Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.	PO2,PO5
CO3	Apply wind engineering principles and computational techniques in designing wind resistant structures.	PO1,PO7,PO4
CO4	Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.	PO3,PO5,PO8
CO5	Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures	PO4,PO6,PO7, PO8, PO9

TEXT BOOKS:

1. David Alexander, Natural Disasters, 1st Edition, CRC Press, 2017.
2. Edward A. Keller and Duane E. DeVecchio, Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes, 5th Edition, Routledge, 2019.

REFERENCE BOOKS:

1. Ben Wisner, J.C. Gaillard, and Ilan Kelman (Editors), Handbook of Hazards and Disaster Risk Reduction and Management, 2nd Edition, Routledge, 2012.
2. Damon P. Coppola, Introduction to International Disaster Management, 4th Edition, Butterworth-Heinemann, 2020.
3. Bimal Kanti Paul, Environmental Hazards and Disasters: Contexts, Perspectives and Management, 2nd Edition, Wiley-Blackwell, 2020.

Online Learning Resources:

1. <https://nptel.ac.in/courses/124107010>
2. https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	-	-	-	-	2	-	2	2	-	-	-
CO-2	-	3	-	-	2	-	-	-	-	-	-	2
CO-3	3	-	-	3	-	-	3	-	-	2	-	-
CO-4	-	-	3	-	3	-	-	2	-	-	-	-
CO-5	-	-	-	3	-	3	3	3	2	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

23OCE361B

**SUSTAINABILITY IN ENGINEERING
PRACTICES (OE – II)**

**L T P C
3 0 0 3**

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.
2. To analyze sustainable construction materials, their durability, and life cycle assessment.
3. To apply energy calculations in construction materials and assess their embodied energy.
4. To evaluate green building standards, energy codes, and performance ratings.
5. To assess the environmental effects of energy use, climate change, and global warming.

UNIT I: INTRODUCTION

(9)

Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO₂ Contribution from Cement and Other Construction Materials.

UNIT 2: MATERIALS USED in SUSTAINABLE CONSTRUCTION

(9)

Cyclones and Their Impact- Climate Change and Its Impact On Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.

UNIT 3: ENERGY CALCULATIONS

(9)

Components of Embodied Energy - Calculation of Embodied Energy for Construction Materials - Energy Concept and Primary Energy - Embodied Energy Via-A-Vis Operational Energy in Conditioned Building - Life Cycle Energy Use.

UNIT 4: GREEN BUILDINGS

(9)

Control of Energy Use in Building - ECBC Code, Codes in Neighboring Tropical Countries - OTTV Concepts and Calculations - Features of LEED and TERI - GRIHA Ratings - Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modeling - Performance Ratings of Green Buildings - Zero Energy Building.

UNIT 5: ENVIRONMENTAL EFFECTS

(9)

Non-Renewable Sources of Energy and Environmental Impact- Energy Norm, Coal, Oil, Natural Gas - Nuclear Energy - Global Temperature, Green House Effects, Global Warming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.	PO1,PO2,PO3,PO4,PO5,PO12
CO2	Analyze sustainable construction materials, their durability, and life cycle assessment.	PO1,PO2,PO3,PO4,PO5,PO12
CO3	Apply energy calculations in construction materials and assess their embodied energy.	PO1,PO2,PO3,PO4,PO5,PO6,PO12
CO4	Evaluate green building standards, energy codes, and performance ratings.	PO1,PO2,PO3,PO4,PO5,PO12
CO5	Assess the environmental effects of energy use, climate change, and global warming	PO1,PO2,PO3,PO4,PO5,PO12

TEXT BOOKS:

1. Charles J Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers 2016.
2. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell, UK, 2016.

REFERENCE BOOKS:

1. Craig A. Langston & Grace K.C. Ding, Sustainable Practices in the Built Environment, Butterworth Heinemann Publishers, 2011.
2. William P Spence, Construction Materials, Methods & Techniques (3e), Yes Dee Publication Pvt. Ltd, 2012

CO-PO MAPPING:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	-	-	-	-	2	3	2	-	-	-	-
CO-2	-	3	-	-	2	-	3	-	-	-	-	2
CO-3	-	-	3	3	3	-	2	-	-	2	-	-
CO-4	-	-	3	3	3	-	3	2	-	-	-	-
CO-5	-	-	-	-	-	3	3	3	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –II Semester

23OEE361A

RENEWABLE ENERGY SOURCES

L T P C

3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the fundamentals of solar radiation, solar geometry, and solar energy collection and storage systems.
2. To provide an understanding of photovoltaic (PV) effect, PV technologies, module characteristics, and PV system configurations.
3. To explain the principles, components, design considerations, and performance estimation of wind energy conversion systems.
4. To familiarize students with geothermal energy resources, technologies, applications, and their prospects in India.
5. To expose students to emerging and miscellaneous renewable energy technologies such as ocean energy, biomass energy, and fuel cells along with their advantages, limitations, and applications.
- 6.

UNIT I: SOLAR ENERGY

(9)

Solar radiation - beam and diffuse radiation, solar constant, Sun at Zenith, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

UNIT 2: PV ENERGY SYSTEMS

(9)

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Solar PV modules from solar cells, mismatch in series and parallel connections design and structure of PV modules, Electrical characteristics of silicon PV cells and modules, Stand-alone PV system configuration, Grid connected PV systems.

UNIT 3: WIND ENERGY

(9)

Principle of wind energy conversion; Basic components of wind energy conversion systems; windmill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades; wind data and energy estimation and site selection considerations

UNIT 4: GEOTHERMAL ENERGY

(9)

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

UNIT 5: MISCELLANEOUS ENERGY TECHNOLOGIES

(9)

Ocean Energy: Tidal Energy-Principle of working, Operation methods, advantages and limitations. Wave Energy-Principle of working, energy and power from waves, wave energy conversion devices, advantages and limitations. Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

23OEC361A

DIGITAL ELECTRONICS

L T P C

3 0 0 3

PRE-REQUISITES: Basic Mathematics

COURSE EDUCATIONAL OBJECTIVES:

1. To Learn Boolean algebra, logic simplification techniques, and combinational circuit design.
2. To analyze combinational circuits like adders, subtractors, and code converters.
3. To explore combinational logic circuits and their applications in digital design.
4. To understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.
5. To gain knowledge about programmable logic devices and digital IC's.

UNIT-:1 INTRODUCTION

(9)

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT-2: INTRODUCTION TO COMBINATIONAL DESIGN 1

(9)

Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT-3: COMBINATIONAL LOGIC DESIGN 2

(9)

Combinational Logic Design 2: Decoders, Encoders, Priority Encoder, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers.

UNIT-4: SEQUENTIAL LOGIC DESIGN

(9)

Sequential Logic Design: Latches, Flip-flops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, set up and hold times, Ripple counters, Shift registers.

UNIT-5: PROGRAMMABLE LOGIC DEVICES AND DIGITAL ICs

(9)

Programmable Logic Devices:ROM, Programmable Logic Devices (PLA and PAL).

Digital IC's:Decoder (74x138), Priority Encoder (74x148), multiplexer (74x151) and de-multiplexer (74x155), comparator (74x85).

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

23OME361A PRINCIPLES OF AUTOMATION AND ROBOTICS L T P C
(MECHANICAL BRANCH) 3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes.
2. Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation.
3. Knowledge of industrial automation and robotics, sensors, and end-effector design for modern manufacturing environments.
4. Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications.
5. Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.

UNIT-1: INTRODUCTION TO AUTOMATION (9)

Introduction to Automation, Need, Types, Basic elements of an automated system, Manufacturing Industries, Types of production, Functions in manufacturing, Organization and information processing in manufacturing, Automation strategies and levels of automation, Hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT-2: AUTOMATED FLOW LINES (9)

Automated flow lines, Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, Quantitative analysis of flow lines. Assembly line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT-3: INTRODUCTION TO INDUSTRIAL ROBOTICS (9)

Introduction to Industrial Robotics, Classification of Robot Configurations, functional line diagram, degrees of freedom. Components common types of arms, joints grippers, factors to be considered in the design of grippers. Robot actuators and Feedback components: Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

UNIT-4: MANIPULATOR KINEMATICS: (9)

Manipulator Kinematics: Manipulator Kinematics, Homogenous transformations as applicable to rotation and translation - D-H notation, Forward inverse kinematics. Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton - Euler formations. Trajectory Planning: Trajectory Planning and avoidance of obstacles path planning, skew motion, joint integrated motion - straight line motion.

UNIT-5: ROBOT PROGRAMMING AND APPLICATIONS (9)

Robot Programming: Lead through programming - Robot language structure - Motion

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

commands of move, speed control, workplace, path, frames, end effector operation, sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming. Robot Applications: Material transfer and machine loading / unloading – Processing applications in spray coating, spot and arc welding – Assembly and inspection automation – Selection of robots in industry applications

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.	L2,L4,L5
CO2	Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.	L4,L5,L6
CO3	Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility	L2,L3,L4
CO4	Apply kinematic and dynamic modeling using D-H notation and select appropriate hardware and control strategies for real-world industrial scenario to analyze and design automated and robotic systems.	L3,L4,L5
CO5	Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks.	L1,L3,L6

TEXT BOOKS:

1. Automation , Production systems and CIM,M.P. Groover /Pearson Edu.
2. Industrial Robotics - M.P. Groover, TMH.

REFERENCE BOOKS:

1. Robotics , Fu K S, McGraw Hill, 4th edition, 2010.
2. An Introduction to Robot Technology, P. Coiffet and M. Chaironze, Kogam Page Ltd. 1983 London.
3. Robotic Engineering , Richard D. Klafter, Prentice Hall
4. Robotics, Fundamental Concepts and analysis – Ashitave Ghosal ,Oxford Press, 1/e, 2006 Robotics and Control , Mittal R K &Nagrath IJ , TMH

REFERENCE WEBSITE:

1. <https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSYmmhl-gt76o>
2. <https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4DwjfSODT3ZjgwEjyE>

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

23OSH361A OPTIMIZATION TECHNIQUES FOR ENGINEERS (OE – II)	L T P C
	3 - - 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. Impart knowledge on theory of optimization and conditions for optimality for unconstrained and constraint optimization problems
2. Inculcate modeling skills necessary to describe and formulate optimization problems in design and manufacturing
3. Familiarize with the working principle of optimization algorithms used to solve linear and non-linear problems
4. Train the students to solve optimization problems using software tools

UNIT I: LINEAR PROGRAMMING I (9)

Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method, Big-M method.

UNIT2: LINEAR PROGRAMMING II: DUALITY IN LINEAR PROGRAMMING (9)

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem, Complementary slackness Theorem

UNIT3: NON - LINEARPROGRAMMING: UNCONSTRAINED OPTIMIZATION TECHNIQUES (9)

Introduction: Classification of Unconstrained minimization methods,

Direct Search Methods: Random Search Methods: Descent Method and Fletcher Powell Method, Grid Search Method

UNIT 4: NON-LINEAR PROGRAMMING: CONSTRAINED OPTIMIZATION TECHNIQUES (9)

Introduction, Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT 5: GEOMETRIC PROGRAMMING (9)

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems: Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

23OSH361B	MATHEMATICAL FOUNDATION OF QUANTUM TECHNOLOGIES(OE – II)	L	T	P	C
		3	-	-	3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To provide students with essential linear algebra foundations including vector spaces, inner products, and operators for quantum mechanical applications.
2. To develop understanding of the transition from finite-dimensional systems to infinite-dimensional function spaces and Hilbert space concepts.
3. To establish quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution principles.
4. To enable students to apply quantum mechanical principles to solve problems in simple quantum systems and understand statistical interpretation.
5. To introduce advanced concepts in composite systems, measurement processes, and modern perspectives in quantum mechanics.

UNIT I: LINEAR ALGEBRA FOUNDATION FOR QUANTUM MECHANICS (9)

Vector spaces definition and examples (\mathbb{R}^2 , \mathbb{R}^3 , function spaces), Inner products (dot product, orthogonality, normalization), Linear operators (matrices, eigenvalues, eigenvectors), Finite-dimensional examples (2×2 matrices, spin-1/2 systems), Dirac notation introduction ($|\psi\rangle$, $\langle\phi|$, $\langle\phi|\psi\rangle$), Change of basis (transformations, unitary matrices).

UNIT2: FROM FINITE TO INFINITE DIMENSIONS (9)

Function spaces (L^2 space, square-integrable functions), Inner products for functions ($\int \psi^* \phi dx$), Orthogonal function sets (Fourier series, basis functions), Introduction to Hilbert space concept (complete inner product spaces), Position and momentum representations (wave functions), Operators on functions (d/dx , multiplication by x).

UNIT3: QUANTUM MECHANICAL FORMALISM (9)

Mathematical formulation (states as vectors, observables as operators), Measurement theory (Born rule, expectation values, probabilities), Uncertainty relations (mathematical derivation from commutators), Time evolution (Schrödinger equation, unitary evolution).

UNIT 4: APPLICATIONS AND STATISTICAL INTERPRETATION (9)

Simple applications (infinite square well, harmonic oscillator), Statistical interpretation (ensembles, pure vs mixed states), Measurement process (von Neumann measurement scheme).

UNIT 5: ADVANCED TOPICS (9)

Composite systems (tensor products basic introduction), Reversibility and irreversibility (unitary evolution vs measurement), Thermodynamic connections (equilibrium states, entropy), Modern perspectives (decoherence, measurement problem conceptual).

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand vector spaces, inner products, and linear operators with applications to quantum systems.	PO1,PO2,PO3,PO4,PO5,PO12
CO2	Apply linear algebra concepts to function spaces and analyze the transition from finite to infinite dimensional systems.	PO1,PO2,PO3,PO4,PO5,PO12
CO3	Analyze quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution.	PO1,PO2,PO3,PO4,PO5,PO12
CO4	Apply quantum mechanical principles to solve problems in simple quantum systems and evaluate statistical interpretations.	PO1,PO2,PO3,PO4,PO5,PO12
CO5	Evaluate advanced concepts in composite systems and synthesize understanding of measurement processes and modern quantum theory.	PO1,PO2,PO3,PO4,PO5,PO6,PO12

TEXT BOOKS:

1. David J. Griffiths, Darrell F. Schroeter, "Introduction to Quantum Mechanics", 3rd Edition, Cambridge University Press (2018).
2. R. Shankar, Principles of Quantum Mechanics, 2nd Edition, Kluwer Academy/Plenum Publishers (1994).

REFERENCE BOOKS:

1. George. F. Simmons, "Introduction to Topology and Modern Analysis", MedTech Science Press.
2. Gilbert Strang, Linear Algebra and Its Applications, 4th Edition, Cengage Learning (2006).
3. John von Neumann and Robert T Beyer, Mathematical Foundations of Quantum Mechanics, Princeton Univ. Press (1996).

REFERENCE WEBSITE:

1. <https://eclass.uoa.gr/modules/document/file.php/CHEM248/Griffiths%20-%20Introduction%20to%20Quantum%20Mechanics%203rd%20ed%202018.pdf>
2. <https://fisica.net/mecanicaquantica/Shankar%20%20Principles%20of%20quantum%20mechanics.pdf>

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	2	2	1	-	-	-	-	-	-	2
CO-2	3	3	2	3	2	-	-	-	-	-	-	2
CO-3	3	3	3	3	2	-	-	-	-	-	-	2
CO-4	3	3	3	3	2	-	-	-	-	-	-	2
CO-5	3	3	3	3	2	1	-	-	-	-	-	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

230SH361C	PHYSICS OF ELECTRONIC MATERIALS AND DEVICES	L T P C
	(Common to all branches)	3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To facilitate a deeper understanding of crystal growth, defects in crystals, and thin-films.
2. To examine and understand the properties, characteristics, and applications of various semiconducting materials, and their role in advancing technology.
3. To establish a solid foundation in the principles and practices of semiconductor physics and devices engineering.
4. To examine the fundamental principles governing excitonic and luminescent processes in solid-state materials, and their significance in optoelectronic applications.
5. To gain insight into the principles, innovations, and applications of modern display systems.

UNIT-1: FUNDAMENTALS OF MATERIALS SCIENCE (9)

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. The basic idea of point, line, and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge).

UNIT -2: SEMICONDUCTORS (9)

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum-well, Change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

UNIT-3: PHYSICS OF SEMICONDUCTOR DEVICES (9)

Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Hetero junctions, Transistors, MOSFETs.

UNIT -4: EXCITONS AND LUMINESCENCE (9)

Luminescence: Different types of luminescence, basic definitions, Light emission in solids, Inter-band luminescence, Direct and indirect gap materials. Photoluminescence: General Principles of photoluminescence, Excitation and relaxation, OLED, Quantum-dot. Electro-luminescence: General Principles of electroluminescence, light emitting diode, diode laser.

UNIT -5: DISPLAY DEVICES (9)

LCD, three-dimensional display: Holographic display, light-field displays: Head-mounted display, MOEMS (Micro-Opto-Electro-Mechanical Systems) and MEMS displays.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

III B. Tech –VI Semester

230SH361D CHEMISTRY OF POLYMERS AND APPLICATIONS L T P C
OPEN ELECTIVE-II (COMMON TO ALL) 3 - - 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the basic principles of polymers
2. To understand natural polymers and their applications.
3. To impart knowledge to the students about synthetic polymers, their preparation and importance.
4. To enumerate the applications of hydrogel polymers
5. To enumerate applications of conducting and degradable polymers in engineering

UNIT – 1: POLYMERS-BASICS AND CHARACTERIZATION: (9)

Basic concepts: monomers, repeating units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: addition, condensation, copolymerization and coordination polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT – II: NATURAL POLYMERS & MODIFIED CELLULOSIC (9)

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulosic: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; speciality plastics- PES, PAES, PEEK, PEA.

UNIT – III: SYNTHETIC POLYMERS (9)

Addition and condensation polymerization processes– Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties. Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers (PE, PVC), Butadiene polymers (BUNA-S, BUNA-N), nylons, Urea-formaldehyde, phenol – formaldehyde, Melamine Epoxy and Ion exchange resins.

UNIT-IV: HYDROGELS OF POLYMER NETWORKS (9)

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Applications of hydrogels in drug delivery.

UNIT – V: CONDUCTING AND DEGRADABLE POLYMERS: (9)

Conducting polymers: Introduction, Classification, Mechanism of conduction in Poly Acetylene, Poly Aniline, Poly Thiophene, Doping, Applications.

Degradable polymers: Introduction, Classifications, Examples, Mechanism of degradation, poly lactic acid, Nylon-6, Polyesters, applications.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Classify the polymers, explain polymerization mechanism, differentiate addition, condensation polymerizations, Describe measurement of molecular weight of polymer	PO1, PO2, PO2, PO4, PO5
CO2	Describe the physical and chemical properties of natural polymers and modified cellulosic.	PO1, PO2, PO2, PO4, PO6
CO3	Differentiate Bulk, solution, Suspension and emulsion polymerization, describe fibers and elastomers, Identify the thermosetting and thermos polymers.	PO1, PO2, PO2, PO4, PO5, PO12
CO4	Identify types of polymer networks, describe methods involve in hydrogel preparation, Explain applications of hydrogels in drug delivery.	PO1, PO2, PO2, PO4, PO5
CO5	Explain classification and mechanism of conducting and degradable polymers.	PO1, PO2, PO2, PO4, PO5

TEXT BOOKS:

1. A Text book of Polymer science, Billmayer
2. Polymer Chemistry – G.S. Mishra
3. Polymer Chemistry – Gowarikar

REFERENCE BOOKS:

1. Organic polymer Chemistry, K.J. Saunders, Chapman and Hall
2. Advanced Organic Chemistry, B. Miller, Prentice Hall
3. Polymer Science and Technology by Premamoy Ghosh, 3rd edition, McGraw-Hill, 2010.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	3	1	2	-	-	-	-	-	-	-
CO.2	3	3	2	2	-	2	-	-	-	-	-	-
CO.3	2	2	3	2	1	-	-	-	-	-	-	2
CO.4	2	3	2	2	3	-	-	-	-	-	-	-
CO.5	2	3	2	3	2	-	-	-	-	-	-	-
CO*	2	3	3	1	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III B. Tech –VI Semester

23OSH361E ACADEMIC WRITING AND PUBLIC SPEAKING L T P C
OPEN ELECTIVE-II (COMMON TO ALL) 3 0 0 3

PRE-REQUISITES:

COURSE EDUCATIONAL OBJECTIVES:

1. To encourage all round development of the students by focusing on writing skills
2. To make the students aware of non-verbal skills
3. To develop analytical skills
4. To deliver effective public speeches

UNIT-1: INTRODUCTION TO ACADEMIC WRITING LECTURE (9)

Introduction to Academic Writing –Essential Features of Academic Writing – Courtesy– Clarity– Conciseness–Correctness–Coherence–Completeness–Types–Descriptive, Analytical, Persuasive, Critical writing

UNIT-2: ACADEMIC JOURNAL ARTICLE LECTURE (9)

Art of condensation-summarizing and paraphrasing-Abstract Writing, writing Project Proposal, writing application for internship, Technical/Research/Journal Paper Writing – Conference Paper writing - Editing, Proof Reading – Plagiarism

UNIT-3: ESSAY & WRITING REVIEWS LECTURE (9)

Compare and Contrast –Argumentative Essay– Exploratory Essay–Features and Analysis of Sample Essays – Writing Book Report, Summarizing, Book/film Review- So P.

UNIT-4: PUBLIC SPEAKING LECTURE (9)

Introduction, Nature, characteristics, significance of Public Speaking – Presentation –4Ps of Presentation–Stage Dynamics–Answering Strategies–Analysis of Impactful Speeches- Speeches for Academic events

UNIT-5: PUBLIC SPEAKING AND NON-VERBAL DELIVERY LECTURE (9)

Body Language–Facial Expressions–Kinesics–Oculesics–Proxemics–Haptics–Chronemics
Paralanguage–Signs

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand various elements of Academic Writing	L1,L2
CO2	Identify sources and avoid plagiarism	L1,L2
CO3	Demonstrate the knowledge in writing a Research chapter	L3
CO4	Analyse different types of essays	L4
CO5	Assess the speeches of other and know the positive strengths of speakers	L5
CO6	Build confidence in giving an impactful presentation to the audience	L3

TEXT BOOKS:

1. Critical Thinking ,Academic Writing and Presentation Skills :MG University Edition Paperback– 1 January 2010Pearson Education; First edition (1 January 2010)
2. Pease,Allan&Barbara.TheDefinitiveBookofBodyLanguageRHUSPublishers,2016

REFERENCE BOOKS:

1. AliceSavage,MasoudShafieiEffectiveAcademicWriting,2Ed.,2014.
2. ShaliniVerma,BodyLanguage,SChandPublications 2011.
3. SanjayKumarandPushpalata, CommunicationSkills2E 2015, Oxford.
4. SharonGerson,StevenGerson, TechnicalCommunicationProcessandProduct,Pearson,New Delhi, 2014
5. Elbow,Peter.WritingwithPower.OUPUSA,1998

ONLINE SERVICES:

1. <https://youtu.be/NNhTIT81nH8>
2. <https://www.youtube.com/watch?v=478ccrWKY-A>
3. <https://www.youtube.com/watch?v=nzGo5ZC1gMw>
4. <https://www.youtube.com/watch?v=Qve0ZBmJMh4>
5. <https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-nonverbal-aspects-of-delivery/>
6. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
7. <https://archive.nptel.ac.in/courses/109/107/109107172/#>
8. <https://archive.nptel.ac.in/courses/109/104/109104107/>

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	2	2	1	-	-	-	-	-	-	1
CO-2	3	3	2	3	2	-	-	-	-	-	-	2
CO-3	3	3	3	3	2	1	-	-	-	-	-	2
CO-4	3	3	2	2	1	-	-	-	-	-	-	1
CO-5	3	3	3	3	2	-	-	-	-	-	-	2

IV B.Tech. - VII Semester

23CAI471T GENERATIVE AI AND PROMPT ENGINEERING

L T P C

3 0 0 3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the foundations and working of Generative AI models.
2. Explore various generative models like GANs, VAEs, and LLMs.
3. Learn prompt engineering techniques to effectively interact with language models.
4. Design applications using LLMs with precise control through prompting.
5. Understand ethical and societal implications of using Generative AI.

UNIT –1: Introduction to Generative AI (9)

Overview of Generative AI and Applications, Generative vs Discriminative Models, Latent Space and Data Generation Concepts, Architectures: GANs, VAEs, Autoregressive Models, Generative AI in Text, Image, Audio, and Video, LLMs: Pretrained Transformers as Generators, Training Challenges and Evaluation of Generative Models, Case Studies: Image Synthesis, Text Generation.

UNIT –2: Prompt Engineering Fundamentals (9)

Introduction to Prompt Engineering, Prompt Formats: Zero-shot, One-shot, Few-shot, Prompt Tuning vs Prompt Programming, In-Context Learning & Chain-of-Thought Prompting, Role of Instructions and Examples in Prompts, Controlling Output Style, Tone, and Format, Prompt Failure Cases and Debugging, Prompt Engineering for Coding, Text Completion, Q&A

UNIT –3: Generative Models in NLP (9)

Transformer Architecture Recap (BERT, GPT), GPT-3/4, PaLM, Claude, and LLaMA Architectures, Text Generation Pipelines and APIs (OpenAI, Hugging Face), Prompt Engineering with GPT Models, Fine-tuning vs Instruct Tuning, Retrieval-Augmented Generation (RAG), Evaluation Metrics: BLEU, ROUGE, Perplexity, Building LLM-based Apps with Lang Chain.

UNIT –4: Advanced Prompt Engineering & Tools (9)

Role of Temperature, Top-k, Top-p Sampling, Structured Outputs: Tables, JSON, Function Calls, Agentic Prompting and Multi-step Reasoning, Prompt Chaining and Memory Handling, Prompt Templates for Automation (Lang Chain, Llama Index), Prompt Engineering for Multimodal Models (DALL·E, Gemini, Sora), Safety Layers & Guardrails in Prompting, AutoGPT, BabyA GI, and Agentic Workflow Building.

UNIT –5: Ethics, Risks, and Applications of Generative AI (9)

Risks: Hallucination, Toxicity, Bias, Deepfakes and Misinformation Challenges, Copyright, IP, and Data Privacy in Generated Content, Evaluation of Responsible AI Outputs, Red Teaming and Safety Testing, Applications in Education, Medicine, Art, and Law, Regulatory Landscape for Generative AI, Future Trends and Research Directions

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Explain the fundamentals of Generative AI, compare model architectures (GANs, VAEs, Transformers), and evaluate their use in generating text, images, and other media.	PO1, PO2
CO2	Apply prompt engineering techniques including few-shot learning, output formatting, and debugging to control and guide generative model outputs.	PO1, PO3
CO3	Analyze the architecture and capabilities of large language models (LLMs), and build NLP applications using prompt engineering and fine-tuning techniques	PO1, PO2, PO4
CO4	Design complex multi-step prompting workflows using tools like Lang Chain and Llama Index, and generate structured or multimodal outputs safely and effectively.	PO1, PO2, PO3, PO4
CO5	Assess the ethical, legal, and societal implications of generative AI, and evaluate its responsible use across fields like healthcare, education, and law.	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. "Deep Learning with Python", François Chollet, Manning, 2nd Edition
2. "Generative Deep Learning", David Foster, O'Reilly, 2nd Edition
3. "Building Systems with ChatGPT", Emmanuel Ameisen (O'Reilly Short Reads)
4. "The Art of Prompt Engineering", Nathan Hunter (Free online eBook)

REFERENCE BOOKS:

1. Vaswani et al., Attention is All You Need
2. OpenAI Technical Reports on GPT Models
3. Papers from NeurIPS, ACL, ICML related to XAI and LLMs
4. Lang Chain Documentation

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B. TECH.-VII SEMESTER

23HSM471A BUSINESS ETHICS AND CORPORATE GOVERNANCE **L T P C**
3 - - 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To make the student understand the principles of business ethics
2. To enable them in knowing about the ethics in management
3. To facilitate the student' role in corporate culture
4. To impart knowledge about the legal Frame-work
5. To provide awareness about the corporate governance

UNIT-I: INTRODUCTION TO ETHICS (9)

Ethics Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior. Value systems - Business Ethics - Types, Characteristics, Factors, Contradictions and Ethical Practices in Management Corporate Social Responsibility – Issues of Management – Crisis Management.

UNIT-II: ETHICS IN MANAGEMENT (9)

Ethics in production, finance, Human resource management and Marketing Management - The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures - Culture and Individual Ethics – professional ethics and technical ethics.

UNIT-III: CORPORATE CULTURE (9)

Introduction - Meaning, definition, Nature, and significance – Key elements of corporate culture, shared values, beliefs and norms, rituals, symbols and language - Types of corporate culture, hierarchical culture, market driven culture – Organization leadership and corporate culture, leadership styles and their impact on culture, transformational leadership and culture change.

UNIT- IV: LEGAL FRAME WORK (9)

Law and Ethics -Agencies enforcing Ethical Business Behavior - Legal Impact – Environmental Protection, Fair Trade Practices, legal Compliances, Safeguarding Health and wellbeing of Customers – Corporate law, Securities and financial regulations, corporate governance codes and principles.

UNIT -V: CORPORATE GOVERNANCE (9)

Introduction - Meaning – Corporate governance code, transparency & disclosure -Role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work - Corporate scams - Committees in India and abroad, corporate social responsibility. BoDs composition, Cadbury Committee Various committees - Reports - Benefits and Limitations.

Total Hours:45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES

At the end of the course, students will be able to		POS
CO1	Understand the Ethics and different types of ethics.	PO6,PO8,PO9,PO10, PO12
CO2	Understand business ethics and ethical practices in management	PO6,PO8,PO9,PO10, PO12
CO3	Understand the role of ethics in management	PO6,PO8,PO9,PO10, PO12
CO4	Apply the knowledge of professional ethics & technical ethics	PO6,PO8,PO9,PO10, PO12
CO5	Analyze corporate law, ethics, codes & principles, Evaluate corporate governance & corporate scams	PO6, PO8,P10,PO12

TEXT BOOKS:

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017
2. Bholanath Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

REFERENCE BOOKS:

1. Dr. K. Nirmala, KarunakaraReaddy. Business Ethics and Corporate Governance, HPH
2. H.R.Machiraju: Corporate Governance, HPH, 2013
3. K. Venkataramana, Corporate Governance, SHBP.
4. N.M.Khandelwal. Indian Ethos and Values for Manager

REFERENCE WEBSITE:

1. https://onlinecourses.nptel.ac.in/noc21_mg46/
2. <https://archive.nptel.ac.in/courses/110/105/110105138/>
3. https://onlinecourses.nptel.ac.in/noc21_mg54/
4. https://onlinecourses.nptel.ac.in/noc22_mg54/
5. <https://archive.nptel.ac.in/courses/109/106/109106117/>

CO-PO MAPPING

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**IV B. TECH.-VII SEMESTER
E-BUSINESS**

23HSM471B

**L T P C
3 - - 3**

PRE - REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on emerging concept on E-Business related aspects
2. To understand various electronic markets & business models.
3. To impart the information about electronic payment systems & banking.
4. To create awareness on security risks and challenges in E-commerce.
5. To make the students aware on different e-marketing channels & strategies

UNIT – I: ELECTRONIC BUSINESS (8)

Introduction – Nature, meaning, significance, functions and advantages - Definition of Electronic Business - Functions of **Electronic Commerce (EC)**-Advantages & Disadvantages of E-Commerce –E-Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

UNIT – II: ELECTRONIC MARKETS AND BUSINESS MODELS: (9)

Introduction –E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals -Business Models- **Business to Business (B2B)**-Business to Customers (B2C) - Business to Government(B2G)-Auctions-B2B Portals in India

UNIT – III: ELECTRONIC PAYMENT SYSTEMS: (9)

Introduction to electronic payment systems (EPS) -Types of electronic payments - Credit/debit cards, e- wallets, UPI, and crypto currencies -Smart cards and digital wallets: Features and usage -**Electronic Fund Transfer (EFT)**: Role in business transactions - Infrastructure requirements and regulatory aspects of e-payments

UNIT – IV: E-SECURITY: (10)

Security risks and challenges in electronic commerce - Cyber threats - Phishing, hacking, identity theft, and malware - Digital Signatures & Certificates - Security protocols over public networks (HTTP, SSL, TLS) - Firewalls in securing e-business platforms.

UNIT – V: E-MARKETING: (9)

Introduction – Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Market Research– – E-marketing planning: Online branding, social media marketing, and email marketing - E-business strategies: Digital advertising, content marketing, and analytics E-Customer Relationship Management (e CRM) E-supply chain management (e-SCM)

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, student will be able to		POs
CO1	Outline the concept of E-Business & its scope and functions.	PO9,PO11,PO12
CO2	Apply the E-market-Models in various business situations and organizations	PO9,PO11,PO12
CO3	Analyze the various E-payment systems & importance of net banking	PO8,PO9, PO11,PO12
CO4	Demonstrate the knowledge gained in E -security and its challenges	PO1,PO6,PO8, PO9, PO11,PO12
CO5	Evaluate market research strategies& E-advertisements.	PO8,PO9,PO10, PO11,PO12

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

TEXT BOOKS:

1. Arati Oturkar & Sunil Khilari. E-Business. Everest Publishing House, 2022
2. P.T.S Joseph. E-Commerce, Fourth Edition, Prentice Hall of India, 2011

REFERENCE BOOKS:

1. Debjani, Kamallesh K Bajaj. E-Commerce, Second Edition Tata McGraw-Hill's, 2005
2. Dave Chaffey. E-Commerce E-Management, Second Edition, Pearson, 2012.
3. Henry Chan. E-Commerce Fundamentals and Application, Raymond Leatham Wiley India 2007
4. S. Jaiswal. E-Commerce Galgotia Publication Pvt Ltd., 2003.

REFERENCE WEBSITE:

1. <https://www.slideshare.net/fatimahAlkreem/e-businessppt-67935771>
2. <https://www.slideshare.net/VikramNani/e-commerce-business-models>
3. <https://www.slideshare.net/RiteshGoyal/electronic-payment-system>
4. <https://www.slideshare.net/WelingkarDLP/electronic-security>

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-	-	-	-	2	-	3	3
CO.2	-	-	-	-	-	-	-	-	2	-	3	3
CO.3	-	-	-	-	-	-	-	2	3	-	3	3
CO.4	2	-	-	-	-	2	-	2	3	-	3	3
CO.5	-	-	-	-	-	-	-	2	2	3	3	3
CO*	2	-	-	-	-	2	-	2	2.6	3	3	3

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

23HSM471C

**IV B. TECH.-VII SEMESTER
MANAGEMENT SCIENCE**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide fundamental knowledge on Management, Administration, Organization & its concepts;
2. To make the students understand the role of management in Production;
3. To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, Job Evaluation and Merit Rating concepts;
4. To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management;
5. To make the students aware of the contemporary issues in modern management.

UNIT- I INTRODUCTION TO MANAGEMENT (9)

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both - Schools of Management Thought - Taylor's Scientific Theory - Henry Fayol's principles - Elton Mayo's Human relations - Organizational Designs - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social Responsibilities of Management.

UNIT - II OPERATIONS MANAGEMENT (9)

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Material Management - Objectives Inventory-Functions - Types, Inventory Techniques – EOQ - ABC Analysis - Marketing Management - Concept - Meaning – Nature - Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

UNIT - III HUMAN RESOURCES MANAGEMENT (HRM) (9)

HRM - Definition and Meaning – Nature - Managerial and Operative Functions - Job Analysis - Human Resource Planning (HRP) - Employee Recruitment - Sources of Recruitment - Employee Selection - Process - Employee Training and Development - Methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration.

UNIT - IV STRATEGIC & PROJECT MANAGEMENT (9)

Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

UNIT - V CONTEMPORARY ISSUES IN MANAGEMENT (9)

Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management (SCM) - Enterprise Resource Planning (ERP) - Performance Management – Employee Engagement and Retention - Business Process Re-engineering and Bench Marking - Knowledge Management – Change Management – Sustainability and Corporate Social Responsibility.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Remember the concepts & principles of management and designs of organization in a practical world	PO6, PO9, PO10, PO11, PO12
CO2	Understand the knowledge of Work-study principles & Quality Control techniques in industry	PO2, PO9, PO10, PO11, PO12
CO3	Apply the process of Recruitment & Selection in organization.	PO9, PO10, PO11, PO12
CO4	Analyze the concepts of HRM & different training methods.	PO2, PO3, PO4, PO5, PO9, PO10, PO11, PO12
CO5	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT	PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

TEXT BOOKS:

1. Frederick S. Hillier, Mark S. Hillier. Introduction to Management Science, October 26, 2023.
2. A.R Aryasri, Management Science, TMH, 2019

REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert. Management, Pearson Education, New Delhi, 2019.
2. Introduction to Management Science, 12e, Bernard W. Taylor, Pearson Education, New Delhi, 2016
3. Koontz & Weihrich, Essentials of Management, 6/e, TMH, 2005.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
5. Samuel C. Certo, Modern Management, 9/e, PHI, 2005
6. R.K. Rajput, "A Textbook of Manufacturing Technology: Manufacturing Processes", 2/e, Laxmi Publications (P) Ltd., New Delhi, 2017.

REFERENCE WEBSITE:

1. <https://www.slideshare.net/slideshow/introduction-to-management-and-organization231308043/23130804>
2. <https://nptel.ac.in/courses/112107238>
3. <https://archive.nptel.ac.in/courses/110/104/110104068/>
4. <https://archive.nptel.ac.in/courses/110/105/110105069/>
5. https://onlinecourses.nptel.ac.in/noc24_mg112

CO-PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B.Tech. - VII Semester

23CAI474L	PROMPT ENGINEERING SKILL ENHANCEMENT COURSE	L	T	P	C
		0	1	2	2

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behavior and performance.
2. Understanding Prompt Engineering is a comprehensive course designed to equip learners with the knowledge and skills to effectively generate and utilize prompts in natural language processing (NLP) and machine learning (ML) applications.
3. This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance.

MODULE 1: INTRODUCTION TO PROMPT ENGINEERING

Lesson 1: Foundations of Prompt Engineering

- Overview of prompt engineering and its significance in NLP and ML.
- Historical context and evolution of prompt-based approaches.

MODULE 2: TYPES OF PROMPTS AND THEIR APPLICATIONS

Lesson 2: Closed-Ended Prompts

- Understanding and creating prompts for specific answers.
- Applications in question- answering systems.

Lesson 3: Open-Ended Prompts

- Crafting prompts for creative responses.
- Applications in language generation models.

MODULE 3: STRATEGIES FOR EFFECTIVE PROMPTING

Lesson 4: Probing Prompts

- Designing prompts to reveal model biases.
- Ethical considerations in using probing prompts.

Lesson 5: Adversarial Prompts

- Creating prompts to stress-test models.
- Enhancing robustness through adversarial prompting.

MODULE 4: FINE-TUNING AND OPTIMIZING WITH PROMPTS

Lesson 6: Fine-Tuning Models with Prompts

- Techniques for incorporating prompts during model training.
- Balancing prompt influence and generalization.

Lesson 7: Optimizing Prompt Selection

- Methods for selecting optimal prompts for specific tasks.
- Customizing prompts based on model behavior.

MODULE 5: EVALUATION AND BIAS MITIGATION

Lesson 8: Evaluating Prompt Performance

- Metrics and methodologies for assessing model performance with prompts.
- Interpreting and analyzing results.

Lesson 9: Bias Mitigation in Prompt Engineering

- Strategies to identify and address biases introduced by prompts.
- Ensuring fairness and inclusivity in prompt-based models.

MODULE 6: REAL-WORLD APPLICATIONS AND CASE STUDIES

Lesson 10: Case Studies in Prompt Engineering

- Exploration of successful implementations and challenges in real-world scenarios.
- Guest lectures from industry experts sharing their experiences

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understanding the fundamentals and evolution of prompt engineering.	PO1, PO2
CO2	Gaining the ability to craft effective closed-ended, open-ended, and role-based prompts.	PO1, PO3
CO3	Learning to probe and stress-test AI models for bias and robustness.	PO1, PO2, PO4
CO4	Applying prompt optimization techniques and performance evaluation methods.	PO1, PO2, PO3, PO4
CO5	Mitigating bias and promoting ethical prompting practices in NLP/ML systems.	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. "Prompt Engineering in Action" — Danny D. Sullivan
2. "The Art of Prompt Engineering with Chat GPT: A Hands-On Guide" — Nathan Hunter.

REFERENCE BOOKS:

1. "Prompt Engineering in Practice" — Michael F. Lewis
2. "Mastering AI Prompt Engineering: The Ultimate Guide for Chat GPT Users" — Adriano Damiao
3. "Writing AI Prompts For Dummies" — Stephanie Diamond and Jeffrey Allan
4. "Prompt Engineering Guide" (Online Resource) —promptingguide.ai

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B.TECH. - VII SEMESTER

23MAC471U

GENDER SENSITIZATION

**L T P C
0 0 2 0**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

- To enable students to understand the gender related issues, vulnerability of women and men
- To familiarize them about constitutional safeguard for gender equality
- To expose the students to debates on the politics and economics of work
- To help students reflect critically on gender violence
- To make them understand that gender identities and gender relations are part of culture as they shape the way daily life is lived in the family as well as wider community and the workplace.

UNIT –1: UNDERSTANDING GENDER (9)

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT –2: GENDER ROLES AND RELATIONS (9)

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio- Demographic Consequences-Gender Spectrum -

UNIT –3: GENDER AND LABOUR (9)

Division and Valuation of Labour-Housework: The Invisible Labor- —My Mother doesn't Work.|| —Share the Load.||-Work: Its Politics and Economics -Fact and Fiction-Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT –4: GENDER-BASED VOILENCE (9)

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

UNIT –5: GENDER AND CULTURE (9)

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Just Relationships

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the basic concepts of gender and its related terminology	PO1, PO2
CO2	Identify the biological, sociological, psychological and legal aspects of gender.	PO1, PO3
CO3	Use the knowledge in understanding how gender discrimination works in our society and how to counter it.	PO1, PO2, PO4
CO4	Analyze the gendered division of labour and its relation to politics and economics.	PO1, PO2, PO3, PO4
CO5	Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. A.Suneetha, Uma Bhrugubanda, et al. Towards a World of Equals: A Bilingual Textbook on Gender, Telugu Akademi, Telangana, 2015.
2. Butler, Judith. Gender Trouble: Feminism and the Subversion of Identity. UK Paperback Edn. March 1990

REFERENCE BOOKS:

1. Wtatt, Robin and Massood, Nazia, *Broken Mirrors: The dowry Problems in India*, London : Sage Publications, 2011
2. Datt, R. and Kornberg, J.(eds), *Women in Developing Countries, Assessing Strategies for Empowerment*, London: Lynne Rienner Publishers, 2002
3. Brush, Lisa D., *Gender and Governance*, New Delhi, Rawat Publication, 2007
4. Singh, Direeti, *Women and Politics World Wide*, New Delhi, Axis Publications, 2010
5. A.Revathy& Murali, Nandini, *A Life in Trans Activism*(Lakshmi Narayan Tripathi). The University of Chicago Press, 2016

REFERENCE WEBSITE:

1. Understanding Gender chrome extension:
[//kdpelmjpfafjppnhbloffcjpeomlnpah/https://www.arvindguptatoys.com/arvindgupta/kamla-gender1.pdf](https://www.arvindguptatoys.com/arvindgupta/kamla-gender1.pdf)

https://onlinecourses.swayam2.ac.in/nou24_hs53/preview
2. Gender Roles and Relations

<https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes>

<https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408>

https://onlinecourses.swayam2.ac.in/cec23_hs29/preview
3. Gender and Labour

<https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed>

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

https://onlinecourses.nptel.ac.in/noc23_mg67/preview

4. Gender-Based Violence

https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en

<https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls>

https://onlinecourses.swayam2.ac.in/nou25_ge38/preview

5. Gender And Culture

<https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/>

<https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/>

<https://archive.nptel.ac.in/courses/109/106/109106136/>

COMAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	3	2.3	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

IV B.TECH. - VII SEMESTER

23CSM471P

EVALUATION INDUSTRY INTERNSHIP

L T P C
0 0 0 2

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

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

INTERNSHIP SCHEME:

1. At the end of the Industrial Internship, the candidate shall submit a certificate from the organization where he/she has undergone industrial training and also a brief report.
2. An industry internship report to be submitted by the individual and along with the internship certificate provided by the organization, which will be reviewed and evaluated by a Committee constituted by the Head of the Department.
3. The evaluation for 100 marks will be carried out internally based on this internship report and a Viva-Voce Examination will be conducted by a Departmental Committee constituted by the Head of the Department/Institution.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate in-depth knowledge on the project topic	PO1
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	PO2
CO3	Design solutions to the chosen project problem.	PO3
CO4	Undertake investigation of project problem to provide valid conclusions	PO4
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	PO5
CO6	Apply project results for sustainable development of the society.	PO6
CO7	Understand the impact of project results in the context of environmental sustainability.	PO7
CO8	Understand professional and ethical responsibilities while executing the project work.	PO8
CO9	Function effectively as individual and a member in the project team	PO9
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	PO10
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	PO11
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	PO12

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO*	3	3	3	3	3	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B.Tech. - VII Semester

**23CAI472A AI-DRIVEN SOFTWARE ENGINEERING & DEVOPS L T P C
(PROFESSIONAL ELECTIVE-IV) 3 0 0 3**

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the principles and practices of AI-driven software engineering and DevOps.
2. To explore how AI techniques can automate and optimize software development workflows.
3. To study intelligent tools for code generation, testing, monitoring, and deployment.
4. To equip students with skills in AI-powered CI/CD pipelines and operations.
5. To foster an understanding of ethical implications and reliability in intelligent software systems.

UNIT –1: Foundations of AI in Software Engineering (9)

Overview of Traditional vs AI-driven Software Development, AI Opportunities in Software Lifecycle Phases, Introduction to ML/DL Models in Engineering Tasks, Code Representation and Learning from Code, NLP for Source Code Understanding, Software Knowledge Graphs and Reasoning, Datasets and Benchmarks for Software Engineering AI, Case Studies of AI-Enhanced Development Tools

UNIT –2: AI Applications in Smart Transportation and Mobility (9)

Program Synthesis and Code Completion Models, Large Language Models (e.g., Codex, Code BERT) in IDEs, Code Clone Detection and Automated Refactoring, Learning-Based Bug Detection and Code Smell Identification, AI in Software Architecture Recommendations, Embedding Techniques for Source Code, Prompt Engineering for Software Tasks, Reliability and Safety in Generated Code

UNIT –3: AI and IOT for Smart Energy, Waste and Water Management (9)

Test Case Generation Using AI, Automated Unit Testing, Regression Testing with ML, Learning Bug Patterns from Repositories, AI-Based Static and Dynamic Code Analysis, Fault Localization and Automated Debugging, Quality Assurance Metrics Enhanced by AI, Reinforcement Learning for Test Prioritization, Ethics and Bias in AI-Driven Testing – (E)

UNIT –4: Smart Healthcare, Surveillance, and Public Safety (9)

DevOps Fundamentals and Integration with AI, Intelligent CI/CD Pipeline Design, Predictive Build Failure and Log Analysis, AI in Infrastructure-as-Code and Deployment Orchestration, Self-Healing Systems and AIOps Concepts, Log Analytics and Anomaly Detection in Production, AI in Monitoring Tracing, and Feedback Loops, Dev SecOps and AI for Security Automation

UNIT –5: A IOT System Design, Deployment, and Governance (9)

Explainability and Transparency in AI-Driven Tools, Ethical and Legal Aspects in Automated Engineering, Human-AI Collaboration in Software Teams, Risk Management in Autonomous Code Deployment, AI for Technical Debt Prediction and Management, AI for Developer Productivity Analytics, Research Trends and Challenges in AI for SE, Capstone: Building a Smart DevOps Workflow

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand AI's role in modern software development and operations.	PO1, PO2
CO2	Apply machine learning techniques to automate software engineering tasks	PO1, PO3
CO3	Design and manage intelligent CI/CD and DevOps workflows.	PO1, PO2, PO4
CO4	Evaluate AI tools in software testing, refactoring, and monitoring.	PO1, PO2, PO3, PO4
CO5	Implement AI-based solutions for predictive maintenance and decision support in DevOps.	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. Tim Menzies, Diomidis Spinellis, and Thomas Zimmermann,—Perspectives on Data Science for Software Engineering||, Morgan Kaufmann.
2. André van der Hoek, Reid Holmes, —Software Engineering for Machine Learning||, Springer.
3. Len Bass, Ingo Weber, Liming Zhu, —DevOps: A Software Architect's Perspective||, Addison-Wesley.

REFERENCE BOOKS:

1. Carlos Eduardo Parnin et al., —AI for Software Engineering: Foundations, Advances, and Trends||, Springer.
2. Luciano Baresi et al., —Machine Learning Techniques for Software Quality Evaluation||, Springer.
3. Gene Kim, Jez Humble, and Nicole Forsgren, —Accelerate: The Science of Lean Software and DevOps||, IT Revolution.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

23CAI472B

**AI FOR ROBOTICS
(PROFESSIONAL ELECTIVE-IV)**

**L T P C
3 0 0 3**

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

- Introduce the fundamental principles of robotics and artificial intelligence integration.
- Understand robot perception, localization, mapping, motion planning, and control using AI algorithms.
- Apply machine learning and deep learning techniques in robotic environments.
- Explore the use of reinforcement learning, behavior-based AI, and neural networks in autonomous robots.
- Enable students to build intelligent robots that can perceive, learn, and adapt to dynamic environments.

UNIT –1: FUNDAMENTALS OF ROBOTICS AND AI (9)

Introduction to Robotics: Types and Components, Overview of Artificial Intelligence and Machine Learning, Relationship between Robotics and AI, Sensors and Actuators in Robotics, Embedded Systems and Microcontrollers in Robotics, Architecture of Autonomous Robots, Programming Tools: ROS (Robot Operating System), Python, C++, Applications of AI in Robotics – Overview

UNIT –2: PERCEPTION AND SENSOR FUSION (9)

Computer Vision for Robotics: Basics and Techniques, Depth Sensing, RGB-D Cameras, LIDAR, and Ultrasonic Sensors, Feature Extraction and Object Recognition, Kalman Filter and Extended Kalman Filter, Particle Filter and Sensor Fusion Techniques, SLAM (Simultaneous Localization and Mapping) – Concepts, Visual SLAM and LiDAR-based SLAM, 3D Mapping and Scene Reconstruction.

UNIT –3: MOTION PLANNING AND NAVIGATION (9)

Path Planning Algorithms – Dijkstra, A*, RRT, Obstacle Detection and Avoidance, Robot Kinematics and Dynamics, Trajectory Generation and Optimization, Localization Techniques – GPS, Wi-Fi, Odometry, Autonomous Navigation in Indoor and Outdoor Environments, Multi-Robot Coordination and Swarm Intelligence, Integration of Perception and Planning Systems

UNIT –4: AI TECHNIQUES IN ROBOTICS (9)

Supervised and Unsupervised Learning for Robotics, Neural Networks and Deep Learning Models for Robot Vision, Reinforcement Learning – Q-Learning and Deep Q Networks, Policy Gradient and Actor- Critic Methods, Behavior-Based Robotics and Finite State Machines, Imitation Learning and Learning from Demonstration, Transfer Learning for Robotic Tasks, Safety and Generalization in AI Models for Robots.

UNIT –5: ADVANCED APPLICATIONS AND ETHICAL CONSIDERATIONS (9)

Humanoid and Service Robots with AI, AI in Industrial, Healthcare, and Assistive Robotics, Edge AI and Real-Time Inference in Robots, Human-Robot Interaction and Social Intelligence, Autonomous Vehicles and Delivery Drones, AI in Robotics Competitions (RoboCup, DARPA), Ethical Issues in AI- Enabled Robotics, Future Trends: Neuromorphic and Quantum Robotics

Total Hours: 45

COURSE OUTCOMES:

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

On successful completion of the course, students will be able to		Pos
CO1	Demonstrate an understanding of how AI techniques are applied in robot control and autonomy	PO1,PO2
CO2	Apply vision, perception, and sensor fusion techniques for real-time robotic applications.	PO1,PO3
CO3	Implement path planning and navigation algorithms in dynamic environments	PO1,PO2,PO4
CO4	Analyze and apply learning-based models such as reinforcement learning and deep neural networks in robotics.	PO1,PO2,PO3, PO4
CO5	Evaluate AI-enabled robotic systems based on their performance, efficiency, and adaptability	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. "Artificial Intelligence for Robotics" by Robin R. Murphy
2. "Probabilistic Robotics" by Sebastian Thrun, Wolfram Burgard, Dieter Fox
3. "Introduction to Autonomous Robots" by Nikolaus Correll, Bradley Hayes, et al.

REFERENCE BOOKS:

1. "Robot Operating System (ROS) for Absolute Beginners" by Lentin Joseph
2. "Modern Robotics: Mechanics, Planning, and Control" by Kevin M. Lynch and Frank C. Park
3. "Learning for Adaptive and Reactive Robot Control" by Aude Billard, Jean-Jacques Slotine
4. IEEE Transactions and Springer Journals on Robotics and Intelligent Systems

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the need for explainability in modern AI systems.	PO1,PO2
CO2	Differentiate between black-box and white-box models.	PO1,PO3
CO3	Apply interpretability techniques such as SHAP, LIME, and PDPs	PO1,PO2,PO4
CO4	Evaluate the fairness and transparency of AI systems	PO1,PO2,PO3, PO4
CO5	Use explainability tools for model auditing and deployment in high- stakes domains.	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. Christoph Molnar, –Interpretable Machine Learning, Lean pub.
2. Sameer Singh et al., –Explainable AI: Interpreting, Explaining and Visualizing Deep Learning, Springer.
3. Dan Roth, Zachary Lipton, and Been Kim, –Explainable AI: Foundations, Developments, Prospects, MIT Press (Online forthcoming).

REFERENCE BOOKS:

1. Marco Tulio Ribeiro et al., –Why Should I Trust You? (LIME) – Research Paper
2. Scott Lundberg et al., –A Unified Approach to Interpreting Model Predictions (SHAP) – NIPS
3. A. Barredo Arrieta et al., –Explainable Artificial Intelligence (XAI): Concepts, Taxonomies, Opportunities and Challenges, Information Fusion Journal.
4. Zachary C. Lipton, –The Mythos of Model Interpretability – Communications of the ACM

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

23CAI473A

**AI FOR SMART CITIES & IOT SYSTEMS
(PROFESSIONAL ELECTIVE-V)**

**L T P C
3 0 0 3**

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the foundational concepts of smart cities and IoT architectures integrated with AI technologies.
2. To explore AI-driven solutions for urban mobility, transportation, and traffic management systems.
3. To apply AI and IoT techniques for efficient energy, waste, and water management in smart urban environments.
4. To examine AI applications in smart healthcare, surveillance, and public safety systems.
5. To design, deploy, and evaluate A IoT systems with an understanding of real-time processing, governance, and future challenges.

UNIT –1: Introduction to AI in Smart Cities and IoT Systems (9)

Smart City Concepts: Components, Infrastructure, and Urban Needs, Overview of IoT and AI Integration, Smart City Frameworks (India, Singapore, EU, etc.), IoT Architecture: Sensing, Network, Processing, and Application Layers, Role of AI in Urban Planning and Resource Optimization, Case Studies on AI in Smart Cities, Edge, Fog, and Cloud Computing Concepts for Smart Systems

UNIT –2: AI Applications in Smart Transportation and Mobility (9)

Traffic Monitoring and Congestion Prediction using AI, Intelligent Traffic Signal Control using Reinforcement Learning, Autonomous Vehicles and AI Algorithms, Vehicle Detection and License Plate Recognition using CV, Public Transport Optimization using Predictive Analytics, Smart Parking and Navigation Systems, Use of Drones and AI for Traffic Surveillance

UNIT –3: AI and IOT for Smart Energy, Waste and Water Management (9)

AI for Smart Grids and Energy Consumption Prediction, Load Balancing and Demand Forecasting using ML, Waste Segregation and Collection Automation using CV, Water Quality Monitoring Systems using IoT Sensors, Leak Detection and Anomaly Detection Models, Smart Metering and Energy Theft Detection, Sustainability and Carbon Monitoring AI Models

UNIT –4: Smart Healthcare, Surveillance, and Public Safety (9)

IoT-based Health Monitoring and Alert Systems, Predictive Healthcare and Disease Outbreak Detection, AI for CCTV Surveillance, Crowd Monitoring, and Violence Detection, NLP for Emergency Response and Chatbot Assistance, Smart Ambulance Routing and Response Optimization, COVID-19 Contact Tracing and Monitoring via AI & IoT, Data Privacy, Security & Ethical Issues in Surveillance systems

UNIT –5: A IOT System Design, Deployment, and Governance (9)

AI Model Deployment on Edge Devices (Raspberry Pi, Jetson Nano), Smart City Dashboards and Data Visualization, Real-time Streaming and Analytics Platforms (Apache Kafka, Spark), Cloud Integration: AWS IoT, Google Cloud AI, Azure IoT Suite, Governance Frameworks,

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Data Privacy, and Policy Standards, Evaluation Metrics for Smart City Projects, Future Trends in A IoT and Smart Urban Living

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Describe the architecture and components of smart cities and explain how AI and IoT integrate to optimize urban planning and services.	PO1, PO2
CO2	Apply AI models in transportation systems to improve traffic flow, public mobility, and autonomous vehicle operations.	PO1, PO3
CO3	Develop AI and IoT solutions for sustainable energy, waste, and water management in smart city ecosystems.	PO1, PO2, PO4
CO4	Analyze AI-based healthcare, surveillance, and emergency response applications, considering privacy and ethical aspects.	PO1, PO2, PO3, PO4
CO5	Design and deploy A IoT systems using edge/cloud platforms and evaluate them using appropriate governance and performance metrics.	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. Pethuru Raj & Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, CRC Press.
2. Janaka Ekanayake, Smart Grid: Technology and Applications, Wiley.
3. Rajkumar Buyya, Fog and Edge Computing: Principles and Paradigms, Wiley.
4. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley.

REFERENCE BOOKS:

1. Mahalik N. P., Sensor Networks and Applications, McGraw Hill.
2. Kim F. Taylor, Urban Artificial Intelligence and Governance, Springer.
3. Dastbaz, J. & Pattinson, C., Smart Cities: Innovation and Sustainability, Springer.
4. Research papers from IEEE Smart Cities, AIoT Journal, and Springer Urban Tech.

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

IV B.TECH. - VII SEMESTER

23CSM472A

**ML OPs & AI MODEL DEPLOYMENT
PROFESSIONAL ELECTIVE-V**

**L T P C
2 1 0 3**

PRE-REQUISITES: MACHINE LEARNING

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the principles and best practices of operationalizing machine learning models in production environments.
2. To explore the life cycle of AI model development, deployment, monitoring, and maintenance using modern MLOps frameworks.
3. To develop skills in CI/CD for ML, reproducibility, model versioning, and containerization using Docker and Kubernetes.
4. To deploy machine learning models using cloud-native services and track their performance using real-time metrics.
5. To address scalability, reliability, and ethical considerations in ML model deployment.

UNIT I: INTRODUCTION TO MLOPS AND DEPLOYMENT PIPELINES (9)

Definition and need of MLOps, ML system lifecycle and pipeline components, DevOps vs. MLOps: key differences, CI/CD for ML projects, Data versioning and model lineage, Introduction to DVC, Git, and MLFlow, Workflow orchestration using Apache Airflow, Automated testing in ML pipelines.

UNIT II: MODEL PACKAGING AND ENVIRONMENT MANAGEMENT (9)

Packaging ML models using Pickle, Joblib, ONNX, Python virtual environments, Conda, Pipenv, Introduction to Docker for ML workloads, Building Dockerfiles for ML apps, Using Kubernetes for orchestration, Security, logging, and resource management, Docker Compose and Helm charts for deployment, Hands-on: Containerize and deploy a scikit-learn model

UNIT III: MODEL SERVING AND APIS (9)

RESTful API design for ML models, Model deployment using FastAPI and Flask, TensorFlow Serving, TorchServe basics, Introduction to gRPC for ML deployment, Asynchronous inference and batch vs real-time serving, Load testing and benchmarking, Authentication and authorization in model APIs, Deploying models on edge devices

UNIT IV: MONITORING, LOGGING, AND CONTINUOUS EVALUATION (9)

Importance of monitoring and alerting in MLOps, Data drift and model drift detection, Logging prediction results and metadata, Prometheus, Grafana, and ELK Stack, A/B testing and canary deployments, Shadow deployments and rollback strategies, Feedback loops for continuous learning, Integration with external monitoring tools.

UNIT V: CLOUD-NATIVE MLOPS AND CASE STUDIES (9)

ML deployment on AWS SageMaker, Azure ML, Google AI Platform, CI/CD using GitHub Actions, Jenkins, and GitLab CI, AutoML and model registry, Real-world case study: End-to-end MLOps pipeline, Challenges and limitations in enterprise ML deployment, Responsible AI in production systems, Future trends in MLOps, Capstone Project Planning

Total Hours:45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

IV B.TECH. - VII SEMESTER

23CSD473A

DATA WRANGLING
(PROFESSIONAL ELECTIVE-V)

L T P C
3 0 0 3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

- To introduce the fundamental techniques for acquiring, cleaning, transforming, and manipulating data.
- To enable students to handle real-world messy data for analysis and machine learning.
- To teach efficient use of libraries like Pandas, NumPy, and SQL for data wrangling.
- To promote understanding of handling missing values, outliers, and inconsistent formats.
- To expose students to automation, reproducibility, and workflow design in data preprocessing.

UNIT –1: INTRODUCTION TO DATA WRANGLING AND DATA ACQUISITION (9)

Introduction to Data Wrangling: Importance and Use Cases, Types of Data: Structured, Semi- Structured, Unstructured, Data Acquisition Techniques: APIs, Web Scraping, Reading Data from CSV, Excel, JSON, XML, Using Python libraries: pandas, requests, BeautifulSoup, Working with Databases using SQLAlchemy and pandas, Loading Large Datasets and Chunking, Exploratory Analysis Before Cleaning.

UNIT –2: HANDLING MISSING, NOISY, AND INCONSISTENT DATA (9)

Identifying and Understanding Missing Data, Techniques for Imputing Missing Values, Handling Inconsistent Data: Dates, Texts, Units, Removing Duplicates and Irrelevant Data, Detecting and Treating Outliers, Normalization and Standardization Techniques, Regular Expressions for Text Cleaning, Visualizing Missing/Outlier Data.

UNIT –3: DATA TRANSFORMATION AND FEATURE ENGINEERING (9)

Data Type Conversion and Parsing , Feature Extraction from Text, Dates, and Strings, One-Hot Encoding, Label Encoding, Binning and Discretization, Data Aggregation and Grouping, Pivoting, Melting, and Reshaping Data, Handling Imbalanced Data, Creating Derived Features and Feature Selection.

UNIT –4: DATA INTEGRATION, JOINING, AND WORKFLOWS (9)

Merging and Joining Datasets (Inner, Outer, Left, Right), Concatenation and Appending DataFrames, Data Consistency and Referential Integrity, Resolving Schema Mismatches, Designing Reusable DataWrangling Functions, Automating Workflows with Functions and Pipelines, Data Lineage and Documentation, Case Study: End-to-End Data Wrangling Pipeline.

UNIT –5: TOOLS, LIBRARIES, AND CASE STUDIES IN DATA WRANGLING (9)

Pandas and NumPy Advanced Techniques, Pyjanitor, Dask, and Polars for Efficient Wrangling, Using OpenRefine for Data Cleaning, SQL vs NoSQL in Data Wrangling, Real- world Wrangling Case Studies (Finance, Healthcare, Retail), Best Practices and Common Pitfalls in Data Wrangling, Reproducibility and Versioning in Data Pipelines, Final Capstone: Build and Evaluate a Clean Dataset for ML/

TOTAL HOURS:45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand and apply core data wrangling techniques.	PO1, PO2
CO2	Clean, transform, and reshape data using Python and SQL.	PO1, PO3
CO3	Handle missing values, data inconsistencies, and outliers.	PO1, PO2, PO4
CO4	Merge and join multiple datasets from different sources.	PO1, PO2, PO3, PO4
CO5	Automate data pipelines and preprocessing workflows for analytics and ML.	PO1, PO2, PO4, PO5

TEXT BOOKS:

1. M. Heydt – Data Wrangling with pandas, O'Reilly Media.
2. Hadley Wickham – R for Data Science (Data Wrangling Chapters), O'Reilly.
3. J. VanderPlas – Python Data Science Handbook, O'Reilly Media

REFERENCE BOOKS:

1. Wes McKinney – Python for Data Analysis, O'Reilly.
2. Cathy O'Neil and Rachel Schutt – Doing Data Science, O'Reilly.
3. David Mertz – Cleaning Data for Effective Data Science, Packt.

REFERENCE WEBSITE:

1. Data Wrangling with pandas (Datacamp):
<https://www.datacamp.com/courses/data-manipulation-with-pandas>
2. Coursera: Data Wrangling, Analysis and AB Testing with SQL –
<https://www.coursera.org/learn/data-wrangling-analysis-abtesting>
3. edX: Data Wrangling with R – <https://online.rice.edu/courses/data-wrangling-r>

COMAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	3	2.3	2	-	-	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

IV B.Tech. - VII Semester

23CAI473B

AI IN HEALTHCARE
(PROFESSIONAL ELECTIVE-V)

L T P C
3 0 0 3

PRE-REQUISITES: Artificial Intelligence

COURSE EDUCATIONAL OBJECTIVES:

1. To provide a foundational understanding of AI applications in healthcare.
2. To familiarize students with medical data types, preprocessing, and ethical considerations.
3. To explore ML and DL algorithms tailored for diagnosis, prognosis, and treatment recommendations.
4. To expose students to real-world healthcare systems and AI solutions like predictive modeling, EHRs, and medical imaging.
5. To enable students to design, evaluate, and deploy AI-driven healthcare applications.

UNIT –1: INTRODUCTION TO AI IN HEALTHCARE (9)

Overview of Healthcare Systems and Data Ecosystem – (U), AI in Clinical Decision Support Systems (CDSS) – (U), Types of Medical Data: EHRs, Imaging, Genomic, Sensor Data – (U), Applications of AI in Diagnosis, Prognosis, and Monitoring – (A), Use Cases: Radiology, Pathology, Oncology, Cardiology – (A), Limitations and Challenges of AI in Healthcare , AI for Telemedicine and Remote Patient Monitoring – (A)

UNIT-2: MEDICAL DATA PREPROCESSING AND FEATURE ENGINEERING(9)

Data Cleaning, Imputation, and Normalization for Clinical Data – (A), Handling Missing Values, Outliers, and Bias – (A), Feature Engineering from EHRs and Time-Series Data – (A), Text Mining for Medical Notes using NLP – (A), Encoding Diagnosis and Procedure Codes (ICD, CPT) – (U), Temporal Pattern Extraction from Clinical Sequences, Data Privacy, Anonymization, and HIPAA Compliance – (AN)

UNIT –3: MACHINE LEARNING & DEEP LEARNING IN HEALTHCARE (9)

Supervised Learning for Risk Prediction and Classification – (A), Unsupervised Learning for Patient Segmentation – (A), Deep Learning for Medical Imaging: CNNs, Transfer Learning – (A), Recurrent Neural Networks for Time-series Clinical Data ,Survival Analysis and Time- to-Event Prediction – (A), Model Evaluation Metrics: Sensitivity, Specificity, AUC – (E), Handling Imbalanced Datasets in Healthcare – (E), Interpretability in Medical ML Models (LIME, SHAP) – (E)

UNIT –4: SPECIALIZED HEALTHCARE AI APPLICATIONS (9)

AI for Disease Diagnosis: Diabetes, Cancer, Heart Disease – (A), AI in Medical Imaging: X-ray, MRI, CT Scan Analysis – (A), Predictive Modeling for ICU Admission & Mortality Risk – (A), AI in Genomics and Personalized Medicine ,Drug Discovery and Repurposing with AI ,Chatbots and Virtual Health Assistants – (A), Remote Monitoring using IoT & Wearables + AI – (A), Designing an End-to-End AI Solution for a Medical Use Case – (C)

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**UNIT –5: ETHICS, REGULATION, AND FUTURE DIRECTIONS IN HEALTHCARE AI
(9)**

Ethical AI in Healthcare: Bias, Fairness, and Accountability ,Regulatory Landscape: FDA Approval, CE Marking – (E), Explainable AI and Clinical Trust – (E), Federated Learning for Privacy-Preserving AI ,Clinical Trials and AI Decision- Support Tools – (E), Case Studies: Google DeepMind, IBM Watson Health, Path AI ,Responsible Deployment of AI in Healthcare Settings – (E), Capstone: Building a Responsible Healthcare AI Proposal – (C)

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the scope, challenges, and benefits of AI in healthcare.	PO1,PO2
CO2	Apply data preprocessing and modeling techniques specific to biomedical data.	PO1,PO3
CO3	Analyze the performance of ML/DL models in clinical contexts.	PO1,PO2,PO4
CO4	Develop AI-driven applications for tasks like disease diagnosis, drug discovery, and patient monitoring.	PO1,PO2,PO3, PO4
CO5	Evaluate ethical, legal, and societal implications of AI in healthcare.	PO1,PO2,PO4, PO5

TEXT BOOKS:

1. Jiang, Fei et al. – Artificial Intelligence in Healthcare: Past, Present and Future.
2. Kevin Frick – Introduction to Healthcare AI.
3. Eric Topol – Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again.

REFERENCE BOOKS:

1. Mathias Goyen – AI in Medical Imaging.
2. Bertalan Meskó – The Guide to the Future of Medicine: Technology and The Human Touch.
3. Peter Szolovits – Artificial Intelligence in Medicine (Morgan Kaufmann).

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	3	2	-	-	-	-	-	-	-
CO*	3	2.8	1.2	1.4	2	-	-	-	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

23OCE471A	IV B. TECH.-VII SEMESTER BUILDING MATERIALS AND SERVICES (OPEN ELECTIVE III)	L T P C 3 - - 3
------------------	---	----------------------------

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminum, glass, paints, and plastics.
2. To analyze the composition, manufacturing process, and properties of cement and admixtures.
3. To apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.
4. To evaluate masonry, mortars, finishing techniques, and formwork systems.
5. To assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection.

UNIT- I (9)
Stones and Bricks, Tiles: Building Stones – Classifications and Quarrying – Properties – Structural Requirements – Dressing. Bricks – Composition of Brick Earth – Manufacture and Structural Requirements, Fly Ash, Ceramics. Timber, Aluminum, Glass, Paints and Plastics: Wood - Structure – Types and Properties – Seasoning – Defects; Alternate Materials for Timber – GI / Fiber – Reinforced Glass Bricks, Steel & Aluminum, Plastics.

UNIT- II (9)
Cement & Admixtures: Types of Cement - Ingredients of Cement – Manufacture – Chemical Composition – Hydration - Field & Lab Tests – Fineness – Consistency- Initial & Final Setting – Soundness. Admixtures – Mineral & Chemical Admixtures – Uses

UNIT- III (9)
Building Components: Lintels, Arches, Walls, Vaults – Stair Cases – Types of Floors, Types of Roofs – Flat, Curved, Trussed; Foundations – Types; Damp Proof Course; Joinery – Doors – Windows – Materials – Types.

UNIT- IV (9)
Mortars, Masonry and Finishing `s Mortars: Lime and Cement Mortars Brick Masonry – Types – Bonds; Stone Masonry – Types; Composite Masonry – Brick-Stone Composite; Concrete, Reinforced Brick. Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP. form Work: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT- V (9)
Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional Requirements Systems of Ventilations. Air-Conditioning - Essentials and Types; Acoustics – Characteristic – Absorption – Acoustic Design; Fire Protection – Fire Hazards – Classification of Fire-Resistant Materials and Constructions.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminum, glass, paints, and plastics.	PO1, PO5
CO2	Analyze the composition, manufacturing process, and properties of cement and admixtures.	PO1,PO2,PO5
CO3	Apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.	PO3,PO1,PO4, PO5
CO4	Evaluate masonry, mortars, finishing techniques, and formwork systems.	PO3,PO5,PO7,PO4
CO5	Assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection	PO6,PO7,PO8

TEXT BOOKS:

1. Building Materials and Construction – Arora& Bindra, Dhan pat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joy Gopal Jena McGraw hill Pvt Ltd 2015.

REFERENCE BOOKS:

1. Building Construction by B. C. Punima, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2. P. C. Varghese, Building Materials, Prentice Hall of India, 2015.
3. N. Subramanian, Building Materials Testing and Sustainability, Oxford Higher Education, 2019.
4. R. Chudleigh, Construction Technology, Longman Publishing Group, 1973.
5. S. K. Duggal, Building Materials, Oxford & IBH Publishing Co. Ltd., New Delhi, 2019

ONLINE LEARNING RESOURCES:

<https://archive.nptel.ac.in/courses/105/102/105102088/>

CO-PO MAPPING:

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	-	-	-	2	-	-	-	-	-	-	-
CO-2	3	3	-	-	2	-	-	-	-	-	-	2
CO-3	3	-	3	2	3	-	-	-	-	-	-	-
CO-4	-	-	3	3	3	-	2	-	-	-	-	-
CO-5	-	-	-	-	-	3	3	2	-	-	-	-

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B. TECH.-VII SEMESTER

230CE471B

**ENVIRONMENTAL IMPACT ASSESSMENT
(OPEN ELECTIVE III)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the principles, methodologies, and significance of Environmental Impact Assessment (EIA).
2. Analyze the impact of developmental activities on land use, soil, and water resources.
3. Evaluate the impact of development on vegetation, wildlife, and assess environmental risks.
4. Develop environmental audit procedures and assess compliance with environmental regulations.
5. Understand and apply environmental acts, notifications, and legal frame works in EIA studies.

UNIT- I CONCEPTS AND METHODOLOGIES OF EIA: (9)

Initial Environmental Examination, Elements of EIA, - Factors Affecting E-I-A Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters-Criteria for The Selection of EIA Methodology, E I A Methods, Ad-Hoc Methods, Matrix Methods, Network Method Environmental Media Quality Index Method, Overlay Methods and Cost/Benefit Analysis.

UNIT- II IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE (9)

Introduction and Methodology for The Assessment of Soil and Ground Water, Delineation of Study Area, Identification of Actives. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures. E I Ain Surface Water, Air and Biological Environment: Methodology for The Assessment of Impacts on Surface Water Environment, Air Pollution Sources, Generalized Approach for Assessment of Air Pollution Impact.

UNIT- III ASSESSMENT OF IMPACT ON VEGETATION, WILD LIFE AND RISK ASSESSMENT (9)

Introduction - Assessment of Impact of Development Activities on Vegetation and Wildlife, Environmental Impact of Deforestation - Causes and Effects of Deforestation - Risk Assessment and Treatment of Uncertainty-Key Stages in Performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment.

UNIT- IV ENVIRONMENTAL AUDIT (9)

Introduction - Environmental Audit & Environmental Legislation Objectives of Environmental Audit, Types of Environmental Audit, Audit Protocol, Stages of Environmental Audit, Onsite Activities, Evaluation of Audit Data and Preparation of Audit Report Report

UNIT- V ENVIRONMENTAL ACTS AND NOTIFICATIONS (9)

The Environmental Protection Act, The Water Preservation Act, The Air (Prevention & Control of Pollution Act), Wild Life Act - Provisions in The EIA Notification, Procedure for Environmental Clearance, Procedure for Conducting Environmental Impact Assessment Report- Evaluation of EIA Report. Environmental Legislation Objectives, Evaluation of Audit Data and Preparation of Audit Report. Post Audit Activities, Concept of ISO and ISO 14000.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Apply various methodologies for conducting Environmental Impact Assessments.	PO1,PO2,PO3,PO4,PO5, PO6
CO2	Analyze the impact of land-use changes on soil, water, and air quality.	PO1,PO2,PO3,PO4,PO5, PO6
CO3	Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments.	PO1,PO2,PO3,PO4,PO5, PO6, PO7
CO4	Develop environmental audit reports and assess compliance with environmental policies.	PO1,PO2,PO3,PO4,PO5, PO6, PO7
CO5	Interpret and apply environmental acts and regulations related to EIA.	PO1,PO2,PO3,PO4,PO5, PO6, PO7,PO8

TEXT BOOKS:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011
2. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)

REFERENCE BOOKS:

1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985.
2. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi
3. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers.
4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

ONLINE LEARNING RESOURCES:

<https://archive.nptel.ac.in/courses/124/107/124107160/>

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	2	2	2	2	3	-	-	-	-	-	1
CO-2	3	3	3	2	2	3	-	-	-	-	-	1
CO-3	3	3	3	2	2	3	3	-	-	-	-	1
CO-4	3	3	3	3	2	3	3	-	-	-	-	1
CO-5	2	2	2	2	2	3	3	3	-	-	-	1

230EE471A

**IV B. TECH.-VII SEMESTER
SMARTGRID TECHNOLOGIES
(OPEN ELECTIVE III)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the evolution, need, architecture, and enabling technologies of Smart Grids with a focus on Indian and international perspectives.
2. To provide fundamental knowledge of synchro-phasor technology and Wide Area Monitoring Systems using PMUs and PDCs.
3. To familiarize students with smart meters, AMR/AMI systems, and their role in demand-side integration and power quality management.
4. To impart understanding of communication technologies and protocols used in Smart Grid information and communication infrastructure.
5. To expose students to Smart Grid applications, renewable and distributed generation integration, advanced energy storage, and cyber security requirements

UNIT –1: INTRODUCTION TO SMART GRID: (9)

Evolution of Electric Grid – Need for Smart Grid – Difference between conventional & smart grid – Overview of enabling technologies – International experience in Smart Grid deployment efforts – Smart Grid road map for India – Smart Grid Architecture.

UNIT –2: WIDE AREA MONITORING SYSTEM: (9)

Fundamentals of Synchro phasor Technology – concept and benefits of Wide Area Monitoring System – Structure and functions of Phasor Measuring Unit (PMU) and Phasor Data Concentrator (PDC) – Road Map for Synchro phasor applications (NAPSI) – Operational experience and Blackout analysis using PMU - Case study on PMU.

UNIT –3: SMART METERS: (9)

Features and functions of Smart Meters – Functional specification – category of Smart Meters – Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) drivers and benefits – AMI protocol – Demand Side Integration: Peak load, Outage and Power Quality management.

UNIT –4: INFORMATION AND COMMUNICATION TECHNOLOGY: (9)

Overview of Smart Grid Communication system – Modulation and Demodulation Techniques: Radio Communication – Mobile Communication – Power Line Communication – Optical Fibre Communication – Communication Protocol for Smart Grid.

UNIT –5: SMART GRID APPLICATIONS AND CYBER SECURITY (9)

Applications: Overview and concept of Renewable Integration – Introduction to distributed generation - Role of Protective Relaying in Smart Grid – House Area Network – Advanced Energy Storage Technology: Flow battery – Fuel cell – SMES – Super capacitors – Plug – in Hybrid electric Vehicles - Cyber Security: Security issues in DG, Distribution Automation, AMI, Electric Vehicle Management Systems – Approach to assessment of smart grid cyber security risks – Methodologies. Cyber Security requirements – Smart Grid Information Model.

Total Hours: 45

IV B. TECH.-VII SEMESTER

23OEC471A

**FUNDAMENTALS OF MICROPROCESSORS AND
CONTROLLERS (OPEN ELECTIVE III)**

**L T P C
3 - - 3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
2. To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

UNIT I – 8085 AND 8086 ARCHITECTURE

(9)

8085 Architecture, Pin diagram, Addressing modes, Instruction set, 8086 Architecture: Introduction, Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response.

UNIT II - 8086 PROGRAMMING

(9)

8086 Programming: 8086 system timing, minimum mode and maximum mode configuration, Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT III - 8086 INTERFACING

(9)

Introduction: Intel 8255 programmable peripheral interface, Interfacing with LEDs, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT IV - MICROCONTROLLER

(9)

Microcontroller: Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits
- Instruction set - Addressing modes - Assembly language programming, Comparison of Microprocessor, Microcontroller, PIC and ARM processors

UNIT V - INTERFACING MICROCONTROLLER

(9)

Interfacing Microcontroller: Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

Total Hours: 45

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Understand the fundamental concepts of prototyping and distinguish between traditional and rapid prototyping methods.
2. Demonstrate the working principles, materials, and applications of solid-, liquid-, and powder- based RP systems.
3. Define the processes and classifications of rapid tooling and reverse engineering techniques.
4. Identify common errors in 3D printing and evaluate pre-processing, processing, and post- processing issues.
5. Familiarize RP-related software and its role in applications such as design, manufacturing, and medical fields.

UNIT –1: INTRODUCTION TO 3D PRINTING (9)

Introduction to 3D Printing Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

UNIT –2: SOLID AND LIQUID BASED RP SYSTEM: (9)

Working Principle, Materials, Advantages, Limitations and Applications of Fusion Deposition Modelling (FDM), Laminated Object Manufacturing (LOM), Stereo lithography (SLA), Direct Light Projection System (DLP) and Solid Ground Curing (SGC).

UNIT –3: POWDER BASED & OTHER RP SYSTEMS: (9)

Powder Based RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Laser Engineered Net Shaping (LENS) and Electron Beam Melting (EBM).

Other RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Three Dimensional Printing (3DP), Ballistic Particle Manufacturing (BPM) and Shape Deposition Manufacturing (SDM)

UNIT –4: RAPID TOOLING & REVERSE ENGINEERING RAPID TOOLING: (9)

Rapid Tooling & Reverse Engineering Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods. Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

UNIT –5: ERRORS IN 3D PRINTING AND APPLICATIONS: (9)

Pre-processing, processing and post-processing errors, Part building errors in SLA, SLS, etc. Software: Need for software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, Solid View, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP. Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Total Hours: 45

IV B. TECH.-VII SEMESTER

23OSH471A WAVELET TRANSFORMS AND ITS APPLICATIONS

L T P C

(OPEN ELECTIVE III)

3 - - 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

UNIT-I: WAVELETS

(9)

Wavelets and Wavelet Expansion Systems - Wavelet Expansion-Wavelet Transform- Wavelet System - More Specific Characteristics of Wavelet Systems - Haar Scaling Functions and Wavelets - effectiveness of Wavelet Analysis -The Discrete Wavelet Transform - The Discrete-Time and Continuous Wavelet Transforms.

UNIT-II: A MULTI RESOLUTION FORMULATION OF WAVELET SYSTEMS

(9)

Signal Spaces -The ScalingFunction -Multiresolution Analysis -The Wavelet Functions -The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

UNIT-III: FILTER BANKS AND THE DISCRETE WAVELET TRANSFORM

(9)

Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating - Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients -Lattices and Lifting - -Different Points of View.

UNIT-IV: TIME - FREQUENCY AND COMPLEXITY

(9)

Multi resolution versus Time - Frequency Analysis- Periodic versus Non periodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

UNIT-V: BASES AND MATRIX EXAMPLES

(9)

Bases, Orthogonal Bases, and Bi orthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms	PO1,PO2,PO3,PO4, PO12
CO2	Illustrate the multi resolution analysis adscaling functions	PO1,PO2,PO3,PO4, PO12
CO3	Implement discrete wavelet transforms with multi rate digital filters	PO1,PO2,PO3,PO4, PO12
CO4	Understand multi resolution analysis and identify various wavelets and evaluate their time-frequency resolution properties.	PO1,PO2,PO3,PO4 ,PO12
CO5	Design certain classes of wavelets to specification and justify the basis of the application of Wavelet transforms to different fields	PO1,PO2,PO3,PO4, PO12

23OSH471B

IV B. TECH.-VII SEMESTER
SMART MATERIALS AND DEVICES
(OPEN ELECTIVE III)

L T P C
3 - - 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the principles and applications of smart materials in engineering.
2. To understand the science behind smart materials and their behavior.
3. To elucidate the responsive characteristics of smart materials
4. To explore synthesis and characterization techniques for smart materials
5. To determine the appropriate smart material for a given application.

UNIT I INTRODUCTION TO SMART MATERIALS (9)

Historical account of the discovery and development of smart materials, Shape memory materials, chromoactive materials, magneto rheological materials, photoactive materials, Polymers and polymer composites (Basics).

UNIT II PROPERTIES OF SMART MATERIALS (9)

Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT III SYNTHESIS OF SMART MATERIALS (9)

Chemical route: Chemical vapour deposition, Sol-gel technique, hydrothermal method, Mechanical alloying and thin film deposition techniques: Chemical etching, Spray pyrolysis.

UNIT IV CHARACTERIZATION TECHNIQUES (9)

Powder X-ray diffraction, Raman spectroscopy (RS), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Atomic force microscopy (AFM).

UNIT V SMART MATERIALS BASED DEVICES (9)

Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

Total Hours: 45

COURSE OUTCOME:

On successful completion of the course, students will be able to		Pos
C01	Describe the breakthroughs that transformed shape memory materials into practical applications. Describe the two phases in shape memory alloys.	PO1, PO2,PO3,PO4,PO5
C02	Investigate how smart materials react to external influences like light, electricity, and heat.	PO1, PO2,PO3,PO4,PO5
C03	Describe synthesis approaches for smart materials.	PO1, PO2,PO3,PO4,PO5
C04	Overview of characterization techniques for understanding smart material behavior.	PO1, PO2,PO3,PO4, PO5
C05	Highlight the advantages of using smart materials in device applications.	PO1, PO2,PO3,PO4

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. YaserDahman,NanotechnologyandFunctionalMaterialsforEngineers-,Elsevier, 2017
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

REFERENCE BOOKS:

1. Gauenzi,P.,SmartStructures,Wiley,2009.
2. MahmoodAliofkhazraei,Handbookoffunctionalnanomaterials,Vol(1&2),NovaPublishers, 2014
3. Hand book of Smart Materials, Technologies, and Devices: Applications of Industry, 4.0, Chaudhery Mustansar Hussain, Paolo DiSia, Springer, 2022.
4. Fundamentals of Smart Materials, Mohsen Shahinpoor, Royal Society of Chemistry, 2020.

NPTEL COURSE LINK:

https://onlinecourses.nptel.ac.in/noc22_me17/preview

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	3	3	2	1	1							
CO3	3	3	1	1	1							
CO4	3	2	1	1	1							
CO5	3	3	1	1	-							
	3	2.8	1.4	1.2	1							

IV B. TECH.-VII SEMESTER

23OSH471C

**INTRODUCTON TO QUANTUM MECHANICS
(OPEN ELECTIVE III)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To comprehend the fundamental distinctions between classical and quantum mechanics.
2. To analyze the concepts of wave-particle duality and the uncertainty principle, along with their physical implications.
3. To acquire knowledge and solve the Schrödinger equation for simple quantum systems.
4. To apply operator formalism and relevant mathematical techniques in the study of quantum mechanics.
5. To investigate the quantum mechanical representations of angular momentum and spin.

UNIT- I: PRINCIPLES OF QUANTUM MECHANICS (9)

Introduction: Limitations of classical Mechanics, Difficulties with classical theories of black body radiation and origin of quantum theory of radiation. Wave-particle duality: de Broglie wavelength, Heisenberg uncertainty principle. Schrödinger time independent and time dependent wave equation, Solution of the time dependent Schrödinger equation, Concept of stationary states, Physical significance of wave function (ψ), Orthogonal, Normalized and Orthonormal functions

UNIT- II: ONE DIMENSIONAL PROBLEMS AND SOLUTIONS (9)

Potential step – Reflection and Transmission at the interface. Potential well: Square well potential with rigid walls, Square well potential with finite walls. Potential barrier: Penetration of a potential barrier (tunneling effect). Periodic potential and Harmonic oscillator, Energy eigen functions and eigen values.

UNIT-III: OPERATOR FORMALISM (9)

Operators, Operator Algebra, Eigen values and Eigen vectors, Postulates of quantum mechanics, Matrix representation of wave functions and linear operators.

UNIT- IV: MATHEMATICAL TOOLS FOR QUANTUM MECHANICS (9)

The concept of row and column matrices, Matrix algebra, Hermitian operators – definition. Dirac's bra and ket notation, Expectation values, Heisenberg (operator) representation of harmonic oscillator, Ladder operators and their significance.

UNIT- V : ANGULAR MOMENTUM AND SPIN (9)

Angular momentum operators: Definition. Eigen functions and Eigen values of AM operators. Matrix representation of angular momentum operators, System with spin half(1/2), Spin angular momentum, Pauli's spin matrices. Clebsch-Gordon coefficients. Rigid Rotator: Eigen functions and Eigen values.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOME:

After completing this course, students will be able to:		Pos
C01	Explain the foundational principles of quantum mechanics	PO1,PO2,PO3,PO4,PO5
C02	Apply Schrödinger equations to solve one-dimensional quantum problems	PO1,PO2,PO3,PO4,PO5
C03	Solve quantum mechanical problems using operator and matrix formulations,	PO1,PO2,PO3,PO4,PO5
C04	Evaluate quantum states using Dirac notation and expectation values.	PO1,PO2,PO3,PO4,PO5
C05	Analyze angular momentum and spin systems using Pauli matrices and operators.	PO1,PO2,PO3,PO4,PO5

BOOKS FOR STUDY:

1. Quantum Mechanics. Vol 1, A. MessiaNoth-Holland Pub. Co., Amsterdam,(1961).
2. A Text Book of Quantum Mechanics. P.M.Mathews and K.Venkatesam, Tata McGraw Hill, New Delhi,(1976).
3. Introduction to Quantum Mechanics. R.H.Dicke and J.P.Witke, Addison-Wisley Pub.Co.Inc., London, (1960).
4. Quantum Mechanics. S.L.Gupta, V.Kumar, H.V.Sarama and R.C.Sharma, Jai PrakashNath& Co, Meerut, (1996).

REFERENCE BOOKS:

1. Quantum Mechanics. L.I. Schiff, McGraw Hill Book Co., Tokyo, (1968).
2. Introduction to Quantum Mechanics. Richard L. Liboff, Pearson Education Ltd (Fourth Edn.) 2003.

NPTEL courses link :

1. <https://archive.nptel.ac.in/courses/115/101/115101107/>
2. <https://archive.nptel.ac.in/courses/122/106/122106034/>
3. <https://nptel.ac.in/courses/115106066>

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	3	2	2	2							
C02	3	2	2	1	1							
C03	3	3	2	1	1							
C04	3	3	3	2	3							
C05	3	3	1	1	1							

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B. TECH.-VII SEMESTER

**23OSH471D GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT (OPEN ELECTIVE-III) L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Understand Principle and Concepts of Green Chemistry.
2. To Understand the Types of Catalysis and Industrial Applications.
3. To Apply Green Solvents in Chemical Synthesis.
4. To Enumerate Different Sourced of Green Energy.
5. To Apply Alternative Greener Methods Foe Chemical Reactions

UNIT I: PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY [9]

Introduction, Green chemistry Principles, sustainable development and green chemistry, E factor, atom economy, atom economic Reactions: Rearrangement and addition reactions and atom un- economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

UNIT 2: CATALYSIS AND GREEN CHEMISTRY [9]

Introduction, Types of catalysis, Heterogeneous catalysis: Basics of Heterogeneous Catalysis, Zeolite and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, and Phase transfer catalysis, Bio-catalysis and Photo- catalysis with examples.

UNIT 3: GREEN SOLVENTS IN CHEMICAL SYNTHESIS [9]

Green Solvents: Concept, Tools and techniques for solvent selection, supercritical fluids: Super critical carbon dioxide, super critical water, Polyethylene glycol (PEG), Ionic liquids, Recycling of green solvents.

UNIT 4: EMERGING GREENER TECHNOLOGIES [9]

Biomass as renewable resource, Energy: Energy from Biomass, Solar Power, Chemicals from Renewable Feedstock's, Chemicals from Fatty Acids, Polymers from Renewable Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency, Mechanochemical synthesis.

UNIT 5: ALTERNATIVE GREENER METHODS [9]

Photochemical Reactions - Examples, Advantages and Challenges, Photo redox catalysis, single electron transfer reactions (SET), Examples of Photochemical Reactions, Microwave-assisted Reactions and Sono chemical reactions, examples and applications.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POS
CO1	Apply the Green chemistry Principles for day-to-day life as well as synthesis, describe the sustainable development and green chemistry, explain economic and un-economic reactions, Demonstrate Polymer recycling.	PO1, PO2, PO3, PO4, PO5, PO7
CO2	Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries, Differentiate Homogeneous and Heterogeneous catalysis, Identify the importance of Bio and Photo Catalysis, Discuss Transition metal and Phase transfer Catalysis	PO1, PO2, PO3, PO4, PO5, PO7
CO3	Demonstrate Green solvents and importance, Discuss Supercritical carbon dioxide, Explain Supercritical water, recycling of green solvents.	PO1, PO2, PO3, PO4, PO5, PO7
CO4	Describe importance of Biomass and Solar Power, Illustrate Sonochemistry, Apply Green Chemistry for Sustainable Development; discuss the importance of Renewable resources, mechanochemical synthesis.	PO1, PO2, PO3, PO4, PO5, PO7
CO5	Discuss Alternative green methods like Photo redox catalysis, single electron transfer reactions (SET), Photochemical Reactions, Microwave-assisted Reactions and Sono chemical reactions, examples and applications.	PO1, PO2, PO3, PO4, PO5, PO7

TEXT BOOKS:

1. M. Lancaster, Green Chemistry an Introductory Text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, Usa

REFERENCE BOOKS:

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and AckmezMudhoo, CRC Press, 2010.
2. Edited by AlvisPerosa and Maurizio Selva, Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

CO PO MAPPING:

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

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

230SH471E

**IV B. TECH.-VII SEMESTER
EMPLOYABILITY SKILLS
(OPEN ELECTIVE III)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To encourage all round development of the students by focusing on productive skills
2. To make the students aware of Goal setting and writing skills
3. To enable them to know the importance of presentations skills in achieving desired goals.
4. To help them develop organizational skills group activities.
5. To function effectively with heterogeneous teams

UNIT-I : GOAL SETTING AND SELF-MANAGEMENT (9)

Definition, importance, types of Goal Setting–SMART Goal Setting–Advantages–Motivation
Intrinsic and Extrinsic Motivation–Self-Management-Knowing about self–SWOC Analysis

UNIT-II: WRITING SKILLS (9)

Definition, significance ,types of writing skills –Resume writing Vs CV Writing -E-Mailwriting,
Cover Letters- E-Mail Etiquette –So P (Statement of Purpose)

UNIT-III: TECHNICAL PRESENTATION SKILLS (9)

Nature, meaning& significance of Presentation Skills– Planning ,Preparation, Presentation, Stage
Dynamics –Anxiety in Public speaking (Glossophobia)- PPT & Poster Presentation

UNIT-IV: GROUP PRESENTATION SKILLS (9)

Body Language – Group Behavior–Team Dynamics –Leadership Skills –Personality Manifestation
-Group Discussion-Debate –Corporate Etiquette

UNIT-V: JOB CRACKING SKILLS (9)

Nature, characteristics, importance &types of Interviews –Job Interviews–Skills for success–Job
Searching skills – STAR method - FAQs-Answering Strategies–Mock Interviews

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POS
CO1	Understand the importance of goals and try to achieve them	PO2
CO2	Explain the significance of self-management	PO6,PO10
CO3	Apply the knowledge of writing skills in preparing eye-catchy resumes	PO10
CO4	Analyze various forms of Presentation skills	PO12
CO5	Judge the group behavior appropriately	PO4

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. Sabina Pillai, Agna Fernandez. Soft Skills & Employability Skills, 2014. Cambridge Publisher.
2. Alka Wadkar. Life Skills for Success, Sage Publications, 2016.

REFERENCE BOOKS:

1. Gangadhar Joshi. Campus to Corporate Paperback, Sage Publications. 2015
2. Sherfield Montgomery Moody, Cornerstone Developing Soft Skills, Pearson Publications. 4Ed. 2008
3. Shikha Kapoor. Personality Development and Soft Skills- Preparing for Tomorrow. 1 Edition, Wiley, 2017.
4. M. Sen Gupta, Skills for Employability, Innovative Publication, 2019.
5. Steve Duck and David T. McMahan, The Basics of Communication Skills A Relational Perspective, Sage press, 2012.

ONLINE SERVICES:

- <https://youtu.be/gkLsn4ddmTs>
<https://youtu.be/2bf9K2rRWwo>
<https://youtu.be/FchfE3c2jzc>
https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHIsQFwJZel_j2PUy0pwjVUgj7KIj
<https://www.youtube.com/c/skillopedia/videos>
https://onlinecourses.nptel.ac.in/noc25_hs96/preview
https://onlinecourses.nptel.ac.in/noc21_hs76/preview
<https://archive.nptel.ac.in/courses/109/107/109107172/#>
<https://archive.nptel.ac.in/courses/109/104/109104107/>

CO PO MAPPING:

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

23OCE472A

**IV B. TECH.-VII SEMESTER
GEO-SPATIAL TECHNOLOGIES
(OPEN ELECTIVE IV)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand raster-based spatial analysis techniques, including query, overlay, and cost- distance analysis.
2. To analyze vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.
3. To apply network analysis techniques for geocoding, shortest path analysis, and location-allocation problems.
4. To evaluate surface and geostatistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.
5. To assess GIS customization, Web GIS, and mobile mapping techniques for real world applications.

UNIT- I RASTER ANALYSIS

(9)

Raster Data Exploration: Query Analysis - Local Operations: Map Algebra, Reclassification, Logical and Arithmetic Overlay Operations—Neighborhood - Operations: Aggregation, Filtering – Extended Neighborhood-Operations- Zonal Operations - Statistical Analysis – Cost-Distance Analysis-Least Cost Path.

UNIT- II VECTOR ANALYSIS

(9)

Non-Topological Analysis: Attribute Database Query, Structured Query Language, Co Ordinate Transformation, Summary Statistics, Calculation of Area, Perimeter and Distance – topological Analysis: Reclassification, Aggregation, Overlay Analysis: Point-In-Polygon, Line-In-Polygon, Polygon-On-Polygon: Clip, Erase, Identity, Union, Intersection – Proximity Analysis: Buffering

UNIT- III NETWORK ANALYSIS

(9)

Network – Introduction - Network Data Model – Elements of Network - Building A Network Database- Geocoding – Address Matching - Shortest Path in A Network – Time and Distance Based Shortest Path Analysis – Driving Directions – Closest Facility Analysis – Catchment / Service Area Analysis- Location-Allocation Analysis

UNIT- IV SURFACE and GEOSTATISTICAL ANALYSIS

(9)

Surface Data – Sources of X, Y, Z Data – DEM, TIN – Terrain Analysis – Slope, Aspect, Viewshed, Watershed Analysis: Watershed Boundary, Flow Direction, Flow Accumulation, Drainage Network, Spatial Interpolation: IDW, Spline, Kriging, Variogram.

UNIT- V CUSTOMISATION, WEBGIS, MOBILEMAPPING

(9)

Customization of GIS: Need, Uses, Scripting Languages –Embedded Scripts – Use of Python Script - Web GIS: Web GIS Architecture, Advantages of Web GIS, Web Applications- Location Based Services: Emergency and Business Solutions - Big Data Analytics.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand raster-based spatial analysis techniques, including query, overlay, and cost- distance analysis.	PO1,PO2,PO3,PO4, PO5,PO6
CO2	Analyze vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.	PO1,PO2,PO3,PO4, PO5,PO6
CO3	Apply network analysis techniques for geocoding, shortest path analysis, and location- allocation problems.	PO1,PO2,PO3,PO4, PO5,PO6, PO7
CO4	Evaluate surface and geostatistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.	PO1,PO2,PO3,PO4, PO5,PO6, PO7
CO5	Assess GIS customization, Web GIS, and mobile mapping techniques for real-world applications.	PO1,PO2,PO3,PO4, PO5,PO6, PO7,PO8

TEXT BOOKS:

1. Kang – Tsung Chang, Introduction to Geographical Information System, 4th Ed., Tata McGraw Hill Edition, 2008.
2. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2002.

REFERENCE BOOKS:

1. Michael N. Demers, Fundamentals of Geographic Information Systems, Wiley,2009
2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasaraju, –An Introduction to Geographical Information Systems, Pearson Education, 2nd Edition, 2007.
3. John Peter Wilson, The Handbook of Geographic Information Science, Blackwell Pub.,2008

ONLINE LEARNING RESOURCES:

<https://archive.nptel.ac.in/courses/105/105/105105202/>
https://onlinecourses.nptel.ac.in/noc19_cs76/preview

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	2	2	2	2	3	-	-	-	-	-	1
CO-2	3	3	3	2	2	3	-	-	-	-	-	1
CO-3	3	3	3	2	2	3	3	-	-	-	-	1
CO-4	3	3	3	3	2	3	3	-	-	-	-	1
CO-5	2	2	2	2	2	3	3	3	-	-	-	1

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.	PO1, PO5,PO7
CO2	Analyze engineering systems for solid waste collection, storage, and transportation.	PO1,PO2,PO5,PO7
CO3	Apply resource and energy recovery techniques for sustainable solid waste management.	PO1,PO3,PO4, PO5, PO7
CO4	Evaluate landfill design, construction, and environmental impact mitigation strategies.	PO3,PO4,PO5, PO8, PO7
CO5	Assess hazardous waste management techniques, including biomedical and e-waste	PO5,PO6, PO7,PO8

TEXT BOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA _Integrated Solid Waste Management, Engineering Principles and Management Issues `McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, _Solid Waste Engineering `Brooks/Cole Thomson Learning Inc., 2002.

REFERENCE BOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, _Environmental Engineering ` , McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, _Geotechnical Aspects of Landfill Design and Construction `Prentice Hall, 2002.

ONLINE LEARNING RESOURCES:

1. <https://archive.nptel.ac.in/courses/105/103/105103205/>
2. <https://archive.nptel.ac.in/courses/120/108/120108005/>

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	-	-	-	2	-	2	-	-	-	-	-
CO-2	3	3	-	-	2	-	3	-	-	-	-	2
CO-3	3	-	3	2	3	-	3	-	-	-	-	-
CO-4	-	-	3	3	3	-	3	2	-	-	-	-
CO-5	-	-	-	-	3	3	3	3	-	-	-	-

IV B. TECH.-VII SEMESTER

230EE472A

**ELECTRIC VEHICLES
(OPEN ELECTIVE IV)**

**L T P C
3- - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Remember and understand the differences between conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.
2. Analyze various EV configurations, parameters of EV systems and Electric vehicle Dynamics.
3. Analyze the basic construction, operation and characteristics of fuel cells and battery charging techniques in HEV systems
4. Design and analyze the various control structures for Electric vehicle

UNIT –1: INTRODUCTION TO EV SYSTEMS AND ENERGY SOURCES: (9)

Past, Present and Future of EV - EV Concept- EV Technology- State-of-the Art of EVs- EV configuration- EV system- Fixed and Variable gearing- Single and multiple motor drive- In-wheel drives- EV parameters: Weight, size, force and energy, performance parameters. Electro mobility and the environment- History of Electric power trains- Carbon emissions from fuels- Green houses and pollutants- Comparison of conventional, battery, hybrid and fuel cell electric systems.

UNIT –2: EV PROPULSION AND DYNAMICS (9)

Choice of electric propulsion system- Block diagram- Concept of EV Motors- Single and multi-motor configurations- Fixed and variable geared transmission- In-wheel motor configuration- Classification
- Electric motors used in current vehicle applications - Recent EV Motors- Vehicle load factors- Vehicle acceleration.

UNIT –3: FUEL CELLS: (9)

Introduction of fuel cells- Basic operation- Model - Voltage, power and efficiency- Power plant system - Characteristics- Sizing - Example of fuel cell electric vehicle - Introduction to HEV- Brake specific fuel consumption - Comparison of Series-Parallel hybrid systems- Examples.

UNIT –4: BATTERY CHARGING AND CONTROL: (9)

Battery charging: Basic requirements- Charger architecture- Charger functions- Wireless charging- Power factor correction.

Control: Introduction- Modelling of electro mechanical system- Feedback controller design approach-PI controller's designing- Torque-loop, Speed control loop compensation- Acceleration of battery electric vehicle

UNIT –5: ENERGY STORAGE TECHNOLOGIES: (9)

Role of Energy Storage Systems- Thermal- Mechanical-Chemical- Electrochemical- Electrical - Efficiency of energy storage systems- Super Capacitors-Superconducting Magnetic Energy Storage (SMES)- SOC- SoH -fuel cells - G2V- V2G- Energy storage in Micro-grid and Smart grid- Energy Management with storage systems- Battery SCADA

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

23OEC472A

**IV B. TECH.-VII SEMESTER
TRANSDUCERS AND SENSORS
(OPEN ELECTIVE IV)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand characteristics of Instrumentation System and the operating principle of motion transducers.
2. To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.
3. To provide knowledge on flow transducers and their applications.
4. To study the working principles of pressure transducers.
5. To introduce working principle and applications of force and sound transducers.

UNIT I -INTRODUCTION

(9)

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

UNIT II - TEMPERATURE TRANSDUCERS

(9)

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo- electric sensors.

UNIT III - FLOW TRANSDUCERS

(9)

Flow Transducers: Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

UNIT IV - PRESSURE TRANSDUCERS

(9)

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

UNIT V - FORCE AND SOUND TRANSDUCERS

(9)

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand characteristics of Instrumentation System and the operating principle of motion transducers.	PO1, PO2
CO2	Explore working principles, and applications of different temperature transducers and Piezo-electric sensors.	PO1, PO2
CO3	Gain knowledge on flow transducers and their applications.	PO1, PO2

IV B. TECH.-VII SEMESTER

230ME472A

FUNDAMENTALS OF QUALITY MANAGEMENT

L T P C

(OPEN ELECTIVE IV)

3 - - 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the fundamental concepts, definitions, and dimensions of quality and Total Quality Management (TQM).
2. To explore the evolution of quality management through historical perspectives and contributions of quality gurus.
3. To explain the core principles of TQM including customer satisfaction, employee involvement, and continuous improvement.
4. To analyze the various TQM tools such as Benchmarking, QFD, FMEA, Six Sigma, and their role in quality enhancement.
5. To provide an understanding of quality systems like ISO 9000, ISO 14000, QS 9000, and the processes for their implementation.

UNIT –1: INTRODUCTION TO QUALITY MANAGEMENT:

(9)

Introduction: Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs – Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

UNIT –2: HISTORICAL REVIEW:

(9)

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy, Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader, Contributions of Gurus of TQM, Case studies.

UNIT –3: PRINCIPLES OF QUALITY MANAGEMENT:

(9)

TQM Principles: Customer Satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment teams, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure Case studies.

UNIT –4: TQM TOOLS:

(9)

TQM Tools: Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

UNIT –5: QUALITY SYSTEMS:

(9)

Need for ISO 9000 – ISO 9001-2008 Quality System – Benefits of ISO registration – ISO 9000 series of standards – AS 9100, TS16949 and TL 9000 – ISO 9001 Requirements – Implementation – Documentation – Internal and external audits – Registration – TQM implementation in manufacturing and service sectors. Environmental Management System: Introduction – ISO 14000 Series Standards – Concepts of ISO 14001—Requirements of ISO 14001 – Benefits of EMS.

Total Hours: 45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**IV B. TECH.-VII SEMESTER
FINANCIAL MATHEMATICS
(OPEN ELECTIVE IV)**

23OSH472A

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide mathematical foundations for financial modelling, risk assessment and asset pricing.
2. To introduce stochastic models and their applications in pricing derivatives and interest rate modelling.
3. To develop analytical skills for fixed-income securities, credit risk, and investment strategies.
4. To equip students with computational techniques for pricing financial derivatives.

UNIT-I: ASSET PRICING AND RISK MANAGEMENT (9)

Fundamental financial concepts: Returns, arbitrage, valuation, and pricing. Asset/Liability management, investment income, capital budgeting, and contingent cash flows. One-period model: Securities, payoffs, and the no-arbitrage principle. Option contracts: Speculation and hedging strategies, CAP Model, Efficient market hypothesis.

UNIT-II: STOCHASTIC MODELS IN FINANCE (9)

Random Walks and Brownian Motion. Introduction to Stochastic Differential Equations (SDEs): Drift and diffusion. Ito calculus: Ito's Lemma, Ito Integral, and Ito Isometry.

UNIT-III: INTEREST RATE AND CREDIT MODELLING (9)

Interest rate models and bond markets. Short-rate models: Vasicek, Cox-Ingersoll-Ross (CIR), Hull & White models, Credit risk modelling: Hazard function and hazard rate.

UNIT-IV: FIXED-INCOME SECURITIES AND BOND PRICING (9)

Characteristics of fixed-income products: Yield, duration, and convexity. Yield curves, forward rates, and zero-coupon bonds. Stochastic interest rate models and bond pricing PDE. Yield curve fitting and calibration techniques, Mortgage Backed Securities.

UNIT-V: EXOTIC OPTIONS AND COMPUTATIONAL FINANCE (9)

Stochastic volatility models and the Feynman-Kac theorem. Exotic options: Barriers, Asians, and Look backs. Monte Carlo methods for derivative pricing, Black-Scholes-Merton model: Derivation and applications.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Explain fundamental financial concepts, including arbitrage, valuation, and risk.	PO1,PO2,PO5,PO11, PO12
CO2	Apply stochastic models, including Brownian motion and Stochastic Differential Equations (SDEs), in financial contexts.	PO1,PO2,PO3,PO4, PO5, PO11,PO12
CO3	Analyze mathematical techniques for pricing options and financial derivatives.	PO1,PO2,PO3,PO4,PO5 ,PO6, PO11,PO12
CO4	Evaluate interest rate models and bond pricing methodologies.	PO1,PO2,PO3,PO4, PO5, PO11,PO12
CO5	Utilize computational techniques such as Monte Carlo simulations for financial modeling.	PO1,PO2,PO3,PO4,PO 5, PO11,PO12

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

TEXT BOOKS:

1. Ales Cerny, Mathematical Techniques in Finance: Tools for Incomplete Markets, Princeton University Press.
2. S.R.Pliska, Introduction to Mathematical Finance: Discrete-Time Models, Cambridge University Press.

REFERENCE BOOKS:

1. Ioannis Karatzas & Steven E. Shreve, Methods of Mathematical Finance, Springer, New York.
2. John C. Hull, Options, Futures, and Other Derivatives, Pearson.

REFERENCE WEBSITE:

- MIT–Mathematics for Machine Learning <https://ocw.mit.edu>
- Coursera – Financial Engineering and Risk Management (Columbia University) <https://www.coursera.org/>
- National Stock Exchange (NSE) India–Financial Derivatives <https://www.nseindia.com/>

CO-PO MAPPING:

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

IV B. TECH.-VII SEMESTER

23OSH472B

**SENSORS AND ACTUATORS FOR ENGINEERING
APPLICATIONS (OPEN ELECTIVE IV)**

**L T P C
3 - - 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide comprehensive exposure to various types of sensors and actuators, along with their engineering applications.
2. To impart fundamental knowledge of the laws and phenomena governing the operation of sensors and actuators.
3. To explain the working principles and functionality of different sensors and actuators.
4. To educate students on the fabrication techniques and processes involved in sensor development.
5. To identify and explain the appropriate sensors and actuators required for interdisciplinary applications.

UNIT-I -INTRODUCTION TO SENSORS AND ACTUATORS

(9)

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.

Actuators: Functional diagram of actuators, Types of actuators and their basic principle of working: Pneumatic, Electromagnetic, Piezo-electric and Piezo-resistive actuators, Applications of Actuators.

UNIT-II- TEMPERATURE AND MECHANICAL SENSORS

(9)

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo- resistive sensors: Thermistors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors: Strain gauges, Tactile sensors, Pressure sensors: Piezoresistive, Variable Reluctance Sensor (VRP).

UNIT-III OPTICAL AND ACOUSTIC SENSORS

(9)

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photoresistors based sensors, Photomultipliers, Infrared sensors: thermal, Passive Infra-Red, Fiber based sensors and Thermopiles Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones

UNIT-IV- MAGNETIC AND ELECTROMAGNETIC SENSORS

(9)

Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto strictive sensors and actuators.

UNIT-V-CHEMICAL AND RADIATION SENSORS

(9)

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Radiation Sensors: Principle and working of Ionization detectors, Scintillation detectors, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

	On successful completion of the course, students will be able to	POs
C01	Classify various types of sensors and actuators along with their key characteristics.	PO1,PO2,PO3, PO4,PO5
C02	Review the working principles and applications of temperature and mechanical sensors.	PO1,PO2,PO3, PO4,PO5
C03	Explain the construction and functionality of different optical and mechanical sensors.	PO1,PO2,PO3, PO4,PO5
C04	Analyze the operational principles and applications of optical and acoustic sensors.	PO1,PO2,PO3, PO4
C05	Interpret the significance of smart materials in the design and development of advanced devices.	PO1,PO2,PO3, PO4

TEXT BOOKS:

1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999

REFERENCE BOOKS:

1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.

NPTEL COURSE LINK:

https://onlinecourses.nptel.ac.in/noc21_ee32/preview

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	3	2	2	1							
C02	3	3	2	1	1							
C03	3	3	1	1	1							
C04	3	2	1	1	-							
C05	3	3	1	1	-							

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

IV B. TECH.-VII SEMESTER

23OSH472C CHEMISTRY OF NANOMATERIALS AND APPLICATIONS L T P C
(OPEN ELECTIVE IV) 3 - - 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand basics and characterization of nanomaterials.
2. To understand synthetic methods of nanomaterials.
3. To apply various techniques for characterization of nanomaterials.
4. To understand Studies of Nano-structured Materials
5. To enumerate the applications of advanced nanomaterials in engineering

UNIT – I BASICS AND CHARACTERIZATION OF NANOMATERIALS [9]

Introduction, Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nanomaterials.

UNIT – II SYNTHESIS OF NANOMATERIALS [9]

Top-Down approach, Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling method.

Synthetic Methods: Bottom-Up approach, Sol-gel synthesis, microemulsions or reverse micelles, co- precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-III TECHNIQUES FOR CHARACTERIZATION [9]

Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV STUDIES OF NANO-STRUCTURED MATERIALS [9]

Synthesis, properties and applications of the following nanomaterials -fullerenes, carbon nanotubes, 2D-nanomaterial (Graphene), core-shell, magnetic nanoparticles, thermoelectric materials, non- linear optical materials.

UNIT-V ADVANCED ENGINEERING APPLICATIONS OF NANOMATERIALS [9]

Applications of Nano Particle, nanorods, nano wires, Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.

Total Hours: 45

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POS
C01	Classify the nanostructure materials; describe scope of nanoscience and importance technology.	PO1, PO2, PO3, PO4, PO5, PO7
C02	Describe the top-down approach, explain aerosol synthesis and plasma arc technique, differentiate chemical vapor deposition method and electrode position method, Discuss about high energy ball milling.	PO1, PO2, PO3, PO4, PO5, PO7
C03	Discuss different technique for characterization of nanomaterial, explain electron microscopy techniques for characterization of nanomaterial, Describe BET method for surface area analysis.	PO1, PO2, PO3, PO4, PO5, PO7
C04	Explain synthesis and properties and applications of nanomaterials, discuss about fullerenes and carbon nanotubes, Differentiate nanomagnetic materials and thermoelectric materials, nonlinear optical materials.	PO1, PO2, PO3, PO4, PO5, PO7
C05	Illustrate advance engineering applications of Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.	PO1, PO2, PO3, PO4, PO5, PO7

TEXT BOOKS:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCES:

1. Concepts of Nano chemistry; LudovicoCademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2	3	1	1	-	2	-	-	-	-	-
C02	2	3	2	2	2	-	1	-	-	-	-	-
C03	2	2	3	1	2	-	1	-	-	-	-	-
C04	3	3	2	2	2	-	2	-	-	-	-	-
C05	2	2	3	1	1	-	1	-	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

23OSH472D

IV B. TECH.-VII SEMESTER
LITERARY VIBES
(OPEN ELECTIVE IV)

L T P C
3 - - 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To inculcate passion for a esthetic sense and reading skills
2. To encourage respecting others' experiences and creative writing
3. To explore emotions ,communication skills and critical thinking
4. To educate how books serve as the reflection of history and society
5. To provide practical wisdom and duty of responding to events of the times

UNIT I: POETRY

1. Ulysses-Alfred Lord Tennyson
2. Night of the Scorpion – Nissim Ezekiel
3. The Second Coming-W.B.Yeats
4. Where the Mind is Without Fear-Rabindranath Tagore

UNIT II : DRAMA: TWELFTH NIGHT-WILLIAM SHAKESPEARE

1. Shakespeare-life and works
2. Plot & sub-plot and Historical background of the play
3. Themes and Criticism
4. Style and literary elements
5. Characters and characterization

UNIT III: SHORT STORY

1. The Luncheon-Somerset Maugham
2. The Happy Prince-Oscar Wild
3. Three Questions–Leo Tolstoy
4. Grief–Antony Chekov

UNIT IV: PROSE: ESSAY AND AUTOBIOGRAPHY

1. My Early Days – Dr. A.P.J. Abdul Kalam
2. The English Teacher – R.K, Narayan
3. The story of My Life-Helen Keller
4. Student Mobs-JB Priestly

UNIT V :NOVE :A TALE OF TWO CITIES-CHARLES DICKENS

1. Charles Dickens-Life and works
2. Plot and Historical background of the novel
3. Themes and criticism
4. Style and literary elements
5. Characters and characterization

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POS
CO1	Identify genres, literary techniques and creative uses of language in literary texts.	PO1, PO2, PO3, PO4, PO5, PO7
CO2	Explain the relevance of themes found in literary texts to contemporary, Personal and cultural values and to historical forces	PO1, PO2, PO3, PO4, PO5, PO7
CO3	Apply knowledge and understanding of literary texts when Responding to others' problems and their own and make evidence-based arguments.	PO1, PO2, PO3, PO4, PO5, PO7
CO4	Analyze the under lying meanings of the text by using the elements of literary texts.	PO1, PO2, PO3, PO4, PO5, PO7
CO5	Evaluate their own work and that of others critically	PO1, PO2, PO3, PO4, PO5, PO7

TEXT BOOKS:

1. Charles Dickens. Hard Times.(Sangam A bridged Texts)VantagePress,1983
2. DENTJC.WilliamShakespeare.TwelfthNight.OxfordUniversityPress,2016.

REFERENCES:

1. W Jong. History of English Literature, Rupa Publications India; First Edition (4October 2015)
2. R K Kaushik And S C Bhatia. Essays, Short Stories and One Act Plays, Oxford University Press .2018.
3. Dhanvel,SP.EnglishandSoftSkills,OrientBlackswan,2017.
4. NewHorizon,Pearsonpublications,NewDelhi2014
5. VimalaRamarao,ExplorationsVolume-II,PrasarangaBangaloreUniversity,2014.
6. DevNeira,Anjana&Co.CreativeWriting:ABeginner'sManual.PearsonIndia, 2008

CO-PO MAPPING:

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

23OPEN472	IV B. TECH.-VII SEMESTER INTRODUCTION TO QUANTUM COMPUTING (OPEN ELECTIVE IV)	L T P C 3 - - 3
------------------	--	----------------------------------

PRE-REQUISITES: Quantum Mechanics and Quantum physics

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the principles and mathematical foundations of quantum computation.
2. To understand quantum gates, circuits, and computation models.
3. To explore quantum algorithms and their advantages over classical ones.
4. To develop the ability to simulate and write basic quantum programs.
5. To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.

UNIT I: FUNDAMENTALS OF QUANTUM MECHANICS AND LINEAR ALGEBRA (9)

Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation, Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT II: QUANTUM GATES AND CIRCUITS (9)

Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility, Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT III: QUANTUM ALGORITHMS AND COMPLEXITY (9)

Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover's Search Algorithm, Shor's Factoring Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT IV: QUANTUM PROGRAMMING AND SIMULATION PLATFORM (9)

Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Results, Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State of Quantum Hardware.

UNIT V: Applications and Future of Quantum Computing (9)

Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum Technologies, Future Trends and Research Directions.

Total Hours:45

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B. TECH.-VIII SEMESTER

23CSM481P

INTERNSHIP

**L T P C
0 0 24 4**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

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

INTERNSHIP SCHEME:

1. At the end of the Industrial Internship, the candidate shall submit a certificate from the organization where he/she has undergone industrial training and also a brief report.
2. An industry internship report to be submitted by the individual and along with the internship certificate provided by the organization, which will be reviewed and evaluated by a Committee constituted by the Head of the Department.
3. The evaluation for 100 marks will be carried out internally based on this internship report and a Viva-Voce Examination will be conducted by a Departmental Committee constituted by the Head of the Department/Institution.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate in-depth knowledge on the project topic	PO1
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	PO2
CO3	Design solutions to the chosen project problem.	PO3
CO4	Undertake investigation of project problem to provide valid conclusions	PO4
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	PO5
CO6	Apply project results for sustainable development of the society.	PO6
CO7	Understand the impact of project results in the context of environmental sustainability.	PO7
CO8	Understand professional and ethical responsibilities while executing the project work.	PO8
CO9	Function effectively as individual and a member in the project team	PO9
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	PO10
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	PO11
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	PO12

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

IV B. TECH.-VIII SEMESTER

23CSM482P

PROJECT WORK

**L T P C
0 0 0 8**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. Discovering potential research areas in the field of Mechanical Engineering.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

PROJECT WORK SCHEME:

1. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design / fabrication / analysis for a specific application, a research project with a focus on an application needed by the industry / society, a computer project, a management project or a design and analysis project. A project topic must be selected by the students in consultation with their guides.
2. A candidate may, however, in certain cases, be permitted to work on projects in an Industrial/ Research Organization, on the recommendations of the Head of the Department Concerned. In such cases, the Project work shall be jointly supervised by a supervisor of the department and an expert, as a joint supervisor from the organization and the student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.
3. To train the students in preparing project reports and to face reviews and viva voce examination. The progress of the project is evaluated based on a minimum of three reviews.
4. As per the guidelines given the project report must be prepared and submitted to the Head of the department before the Viva-Voce Examination.
5. The student shall make presentation on the progress made before the Committee.
6. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

