Academic Program: UG

Academic Year 2025-26

Syllabus

VII & VIII Semester B.E.

Information Science and Engineering

SHRI DHARMASTHALA MANJUNATHESHWARA COLLEGE OF ENGINEERING & TECHNOLOGY,
DHARWAD – 580 002
(An Autonomous Institution approved by AICTE & Affiliated to VTU, Belagavi)

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SDM College of Engineering & Technology, Dharwad

It is certified that the scheme and syllabus for VII & VIII semester of UG program in Information Science & Engineering is recommended by Board of Studies of Information Science & Engineering Department and approved by the Academic Council, SDM College of Engineering & Technology, Dharwad. This scheme and syllabus will be in force from the academic year 2025-26 till further revision.

Principal Chairman BoS & HoD

College Vision and Mission

SDMCET-Vision

To develop competent professionals with human values.

Mission

- To have contextually relevant Curricula.
- To promote effective Teaching Learning Practices supported by Modern Educational Tools and Techniques.
- To enhance Research Culture.
- To involve Industrial Expertise for connecting classroom content to real life situations.
- To inculcate Ethics and impart soft-skills leading to overall Personality Development.

SDMCET- Quality Policy

❖ In its quest to be a role model institution, committed to meet or exceed the utmost interest of all the stake holders.

SDMCET- Core Values

- Competency
- Commitment
- Equity
- Team work and
- Trust

Vision and Mission of Department

Vision

To develop competent Information Technology Engineers having complete knowledge and skills in contemporary Information Technology practices.

Mission

1. To develop contemporary curriculum in information technology delivered
2. To provide facilities for relevant research and expose students to the best
3. To inculcate the best moral values and professional ethics in students

Program Educational Objectives (PEOs):

I. Develop into Information Technology Professionals with expertise in providing solutions to Information Engineering problems

II. Pursue higher studies with the sound knowledge of basic concepts and skills in basic science, humanities and Information Technology disciplines

III. Exhibit professionalism and team work by providing the environment for
   a. exploring current technology trends through collaborative and complementary work ethics

PO's and PSO's

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

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

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

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

PO5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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

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

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

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

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

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

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

PSO13. An ability to develop logical reasoning, coding skills, analysis and mathematical modeling.

PSO14. An ability to modify, debug, test and adapt software modules for varied applications.

SDM College of Engineering and Technology

Department of Information Science and Engineering

VII Semester

Scheme of Teaching and Examination 2025-26

Sl. No	Course	Course code	Course Title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	22UISC700	Cyber Security & Cryptography	ISE	4	0	0	03	50	100	100	4
2	PEC	22UISE7XX	Program Elective Course-IV	ISE	3	0	0	03	50	100	100	3
3	PEC	22UISE7XX	Program Elective Course-V	ISE	3	0	0	03	50	100	100	3
4	OEC	22UISO7XX	Open Elective Course-II	ISE	3	0	0	03	50	100	100	3
5	PCCL	22UISL701	Machine Learning Laboratory	ISE	0	0	2	03	50	50	100	1
6	PROJ	22UISL702	Major Project-I	ISE	0	0	12	03	50	50	100	6
								Total			**600**	**20**
Program Elective Course -IV												
1	PEC-IV	22UISE721	Blockchain Technology	ISE	3	0	0	03	50	100	100	3
2	PEC-IV	22UISE722	Edge Computing	ISE	3	0	0	03	50	100	100	3
Program Elective Course -V												
1	PEC-V	22UISE731	Deep Learning	ISE	3	0	0	03	50	100	100	3
2	PEC-V	22UISE732	Cloud Computing	ISE	3	0	0	03	50	100	100	3
Open Elective Course-II												
1	OEC-II	22UISO741	Data Science	ISE	3	0	0	03	50	100	100	3
2	OEC-II	22UISO742	Supply Chain Management	ISE	3	0	0	03	50	100	100	3

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, L: Lecture, T: Tutorial, P: Practical, CIE: Continuous Internal Evaluation, SEE:

Semester End Evaluation. PEC: Program elective course, OEC: Open elective course, PROJ: Project. TD: Teaching department, PSB: Paper setting Board.s
Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum numbers of students' strength for offering Open Elective Course are as prescribed by the DAP.
Open Elective Courses (OEC): Students belonging to a particular stream of Engineering and Technology are entitled to opt for the open electives offered by their parent Department and other departments provided that they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course are as prescribed by the DAP.
Major Project-II: The objective of the project work is to encourage development of independent learning, innovative attitude, communication skills, organisation, time management, presentation skills, team work, punctuality, setting and meeting deadlines. In Major project the students are expected to identify the state-of-the-art technology in their domain of interest by an extensive literature survey and select a topic from an emerging area relevant to their branch/interdisciplinary and define the problem for the project work. The project shall consist of a team of students not more than 2-4. Each batch shall be assigned with a faculty member. A committee constituted by HOD consisting of minimum 2 faculty members shall evaluate for CIE. There is SEE, a viva voce examination which shall be examined by two examiners constituted by the HoD. The rubrics of evaluation includes objectives defined, literature review, demonstration of the project work carried out, report, project presentation,communication skill and question and answer session.
AICTE activity point: Every regular student, who is admitted to the 4-year degree program, is required to earn 100 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students VIII semester grade card. The activities to earn the points can be spread over the duration of the program. However, minimum prescribed duration should be fulfilled. Activity points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case student fails to earn the prescribed activity points; VIII semester grade card shall be issued only after earning the required activity Points. Students shall be eligible for the award of degree only after the release of the VIII semester grade card.

SDM College of Engineering and Technology

Department of Information Science and Engineering

VIII Semester

Scheme of Teaching and Examination 2025-26

Sl. No	Course	Course code	Course Title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	TS	22UISL800	Technical Seminar/Independent study	ISE	0	0	2	-	50	-	50	1
2	PROJ or INT	22UISL801	Major Project-II / Internship	ISE	12 Weeks			03	50	50	100	10
3	INT	22UISL802	Summer Internship	ISE	4 Weeks			03	50	50	100	3
								Total			**250**	**14**

L: Lecture, T: Tutorial, P: Practical, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation., TD: Teaching department, PSB: Paper setting Board.

Technical Seminar/Independent study (TS): Students are expected to learn how to conduct a literature survey to identify the state-of-the-art technology in their chosen engineering domain. They are required to select an emerging topic beyond the syllabus relevant to their branch of study, understand the concept, analyse it, and present it effectively with technical innovations or novel work in a 15–20minute session, followed by a 5-minute question and answers with their classmates and faculty. Additionally, students must develop effective communication skills and understand the modalities of technical interactions. They are required to submit a seminar report following the format provided by the DUGC. The technical seminar is evaluated for CIE based on the rubrics prescribed by the DUGC.

Summer Internship: Students must undergo an internship in private industries, R&D organizations, Center of Excellence, laboratories of reputed institutions, government and semi-government organizations, PSUs, construction companies, or entrepreneurial organizations to gain exposure to the external professional

environment. The internship should be completed over a period of four weeks during the summer vacation after the IV or VI semester and must be completed before the VII semester.Students are required to prepare a report on the work carried out during the internship and submit both the report and the internship certificate during the VIII semester. The internal faculty will monitor student performance and award CIE marks in the VIII semester. Additionally, there will be a SEE, in which students must present their work before a panel of two examiners constituted by the HoD during the SEE of the VIII semester.

Major Project-II: This project work is intended for students who do not undertake an internship. The objective of the project is to foster independent learning, an innovative mindset, communication skills, organization, time management, presentation skills, teamwork, punctuality, and the ability to set and meet deadlines.In this project, students are expected to conduct an extensive literature survey to identify state-of-the-art technology in their domain of interest, select a topic from an emerging area relevant to their branch or an interdisciplinary field, and define the problem for their project work. Each project team shall consist of 2 to 4 students and will be assigned a faculty mentor.The department shall conduct three project reviews as per the schedule provided by DAP, which must be recorded as part of the project evaluation for CIE, along with marks awarded by the faculty guide. A committee constituted by the HoD, consisting of a minimum of two faculty members, shall conduct the reviews and evaluate the CIE.For SEE, students must appear for a viva-voce examination, which will be assessed by a panel of two examiners—one internal and one external—constituted by the HoD.The rubrics of evaluation includes objectives defined, literature review, demonstration of the project work carried out, report, project presentation,communication skill and question and answer session.

Internship: The internship is intended for students who do not undertake a project. Students must undergo an internship in private industries, R&D organizations, Center of Excellence, laboratories of reputed institutions, government and semi-government organizations, PSUs, construction companies, or entrepreneurial organizations to gain exposure to the external professional environment. The internship shall be for a duration of 12 weeks during the VIII semester, either through placement or on an individual basis.Students are required to prepare a report on the work carried out during the internship and submit both the report and the internship certificate during the VIII semester. The department shall conduct three project reviews as per the schedule provided by DAP, which must be recorded as part of the project evaluation for CIE.A committee constituted by the HoD, consisting of a minimum of two faculty members, shall conduct the reviews and evaluate the CIE. For SEE, students must appear for a viva-voce examination, which will be assessed by a panel of two examiners—one internal and one external—constituted by the HoD.The rubrics of evaluation includes objectives defined, literature review, demonstration of the work carried out, report, project presentation,communication skill and question and answer session.

AICTE activity point: Every regular student, who is admitted to the 4-year degree program, is required to earn 100 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students VIII semester grade card. The activities to earn the points can be spread over the duration of the program. However, minimum prescribed duration should be fulfilled. Activity points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case student fails to earn the prescribed activity points; VIII semester grade card shall be issued only after earning the required activity Points. Students shall be eligible for the award of degree only after the release of the VIII semester grade card.

Total credits offered for the fourth year: 34

22UISC700	Cyber Security & Cryptography	(4-0-0) 4

Contact Hours: 52

Course Learning Objectives (CLOs):

This course is designed to provide theoretical concepts used in cryptography and to introduce the students to various cryptographic algorithms and techniques used for implementing data security and protection. This course also discusses common web application security vulnerabilities.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs (1-12)/ PSOs (13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Understand and analyze** various types of security attacks, mechanisms, and services and **Make** use of Symmetric and Asymmetric encryption techniques to solve cryptographic problems.	1	-	12
CO-2	**Apply** encryption techniques to secure information.	-	2	-
CO-3	**Describe** the concepts of Public key cryptography.	1	2	12
CO-4	**Illustrate** the concepts of message authentication codes, hash functions and digital signing techniques for ensuring secure transactions	1	-	2
CO-5	**Explain** Cyber Crime and security and Digital Forensics	1,8	3	12

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	3	1.6	2	-	-	-	-	3	-	-	-	1	-	-

Pre-requisites: Computer Networks

Contents:

Unit-I

Introduction to Cryptography, OSI security architecture: Security Services, Mechanisms and attacks, Network security model. Classical Encryption techniques - Symmetric cipher model, substitution techniques, transposition techniques. Steganography. **10 Hrs.**

Unit-II

Symmetric Key Cryptography : Mathematics of Symmetric Key Cryptography: Algebraic structures – Modular arithmetic-Euclids algorithm- Congruence and matrices -Groups, Rings, Fields- Finite fields- Symmetric Key Ciphers: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard RC4 Key distribution. **10 Hrs.**

Unit-III

Public key cryptography: Mathematics of Asymmetric Key Cryptography: Primes – Primality Testing –Factorization – Euler‘s totient function, Fermat‘s and Euler‘s Theorem – Chinese Remainder Theorem – Exponentiation and logarithm – Asymmetric Key Ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography **10 Hrs.**

Unit-IV

Hash Functions and MAC: Properties of hash functions, birthday attack, hashcash, Message Authentication Code Algorithms, MAC protocols: HMAC, CMAC.

Digital Signatures: Classification of signature schemes: RSA signature, Digital Signature Standard, One time signature schemes, Attacks on Digital Signatures, Blind Signatures. **10 Hrs.**

Unit-V

Security Practice and System Security: Email Security: Security Services for email, Attacks possible through email, Establishing keys privacy, authentication of the source, Message Integrity, Non-repudiation, Pretty Good Privacy, S/MIME.
IP Security: Overview of IPSec, Authentication Header, Encapsulation Security Payload (ESP), Internet Key Exchange.

12 Hrs.

Reference Books:

1. William Stallings, "Cryptography and Network Security," 6th Edition, Pearson Education, March 2013.
2. Behrouz A. Forouzan, "Introduction to Cryptography and Network Security", Tata McGraw-Hill Publishing 2nd Edition (2011).
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.
4. Manuel Mogollon, "Cryptography and Security Services – Mechanisms and Applications", Cybertech Publishing, 2008.

22UISL701	Machine Learning Lab	(0-0-2)1

Contact Hours:26

Course Learning Objectives (CLOs):

Students will be exposed to the programming tools such as python and libraries like scikit-learn, TensorFlow, or PyTorch,learn to apply appropriate algorithms to solve real-world problems using classification, regression, clustering, and dimensionality reduction techniques and perform feature selection, normalization, and data cleaning to improve model performance.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/ PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Apply** key data pre-processing techniques by importing the data and **Compute and interpret**	1	5, 13, 14	8,10,12

	various similarity measures			
CO-2	**Build a** regression model, analyze its performance and **Interpret** and visualize cluster results.	1,2,13,14	5	8,10,12
CO-3	**Apply** classification algorithms for a given data set and analyze the performance metrics.	1, 2,13,14	5	8, 10, 12
CO-4	**Design** and train Artificial Neural Networks with back propagation on real datasets.	1,2	3, 5,13,14	8,10,12
CO-5	**Implement** data reduction technique and Develop a Q-learning agent	2,13,14	1,3,5	8,10, 12

POs/PSOs	PO1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	2.8	3.0	2.0	-	2.0	-	-	-	-	1.0	-	1.0	1.6	1.6

Pre-requisites:

1. Basic knowledge of statistics and Python programming language

This course aligns with the 6th Semester Machine Learning theory course (22UISC600).

Content:

1. **Dataset Handling**: Creation, uploading, and importing of datasets from various sources(e.g., CSV, Excel, online repositories).
2. **Data Preprocessing**: Handling missing values, Data transformation and normalization, Data imputation, and splitting the dataset into training and test sets.
3. **Machine Learning Model Development**:
    - Implementation of machine learning algorithms covering: Concept Learning, Regression, Classification, Clustering, Dimensionality Reduction, Recommendation Systems
    - Training models on the training dataset
    - Making predictions on the test dataset
4. **Model Evaluation and Visualization**:

- Visualizing training and test set results (e.g., confusion matrix, ROC curves, accuracy plots).
- Drawing decision trees for classification tasks.
- Evaluating model performance using appropriate metrics (accuracy, precision, recall, F1-score, etc.).

Reference Books:

1. Andreas C. Muller, Sarah Guido, “Introduction to Machine Learning with Python”, O'Reilly Media, Inc, 2016.

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning”, 2ndEdition, Springer series in statistics, 2017.
3. Amit Kumar Das & Saikat Dutt & Subramanian Chandramouli, Amit Kumar Das, “ Machine Learning”, Pearson Education India, 2018.,

22UISL702	**Major Project – I**	**(0-0-12)6**

Contact Hours: **156**

Course Learning Objectives (CLOs): Understand the domain, analyze through Modeling and Implementation through state of the art technology available. Know Software Engineering Principles: Modeling, Estimation, Design standards and architectural issues through use of Standards etc. To write modular programs and handle exceptions to provide reliable solutions. To test and verify the programs for different scenarios.

Course Outcomes (COs):

Description of the course outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Demonstrate** an ability to work in teams and manage the conduct of the research study and Summarize literature review for a given topic.	2, 4, 9	1, 8	12

CO-2	**Identify** problem from literature review.	2	1	12
CO-3	**Define** objectives for the problem and decide on methodology.	-	1, 2	-
CO-4	**Compare** and contrast the several existing methods for solving the chosen problem.	2, 3	5, 13, 14	6, 12
CO-5	**Demonstrate** the use of presentation techniques for effective communication and demonstration of ethics and societal concern in the given solution.	5, 6, 7, 10	8	11, 12
CO-6	**Analyze** requirement of solution for the given problem with teamwork and multidisciplinary approach.	9, 11, 13	3, 8, 14	1

POs/PSOs	PO1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	2.0	3.0	3.0	3.0	3.0	2.0	3.0	2.0	3.0	3.0	2.0	1.0	2.0	2.0

Prerequisites: Different programming languages / tools.

Contents:

Major project phase-1 in which the students are expected to locate the state of the art technology in his domain of interest by an extensive literature survey and Select a topic from an emerging area relevant to their branch/interdisciplinary and define the problem for the project work. The material collection, survey, visits, data collection, preliminary design, analysis etc. is to be done in this phase. The project shall consist of a team of students not more than 4. Each batch shall be assigned with a guide. A committee consisting of minimum 3 faculty members of which guide is a member shall evaluate at the end for CIE. The weight age of marks shall be 50% for the committee and 50% for the guide. There is a SEE (viva voce) examination which shall be examined by two internal examiners appointed by COE based on the suggestions by the respective HoD.

General Instructions to Students:

1) Students are expected to perform extensive literature survey, identify problem statements and prepare synopsis in consultation with project guide/supervisor. Students are expected to submit synopsis- Initial (Registration Phase-1) approved by project guide, to the project coordinator as per the schedule notified. A copy is to be maintained with students and the guide. This registration/ Initial synopsis contains the description of the project concept created and acts as a base line for design and Implementation of the system.
2) Notification/schedules and evaluation procedures will be sent to all students in the Google groups created in the department.
3) Evaluation of problem statement/synopsis-Initial (registration phase-1), Literature Survey and SRS (Requirement Analysis Phase-1) are done in the 7th semester.

Sl No	Parameters for Assessment	% of weightage for CIE and SEE
P1	Project Synopsis/ Proposal Evaluation	15
P2	Literature survey/Technology used / Architectural design	15
P3	Requirement Analysis (SRS)	15
P4	Design methodology/Demonstration of tool used for designing	10
P5	Implementation modules	15
P6	Discussion of test cases /Project demonstration	15
P7	Project Report(phase-1 and Phase-2)	10
P8	Paper Publication/Presentation	05

22UISE721	Blockchain Technology	(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs):

To help the students design and develop secure solution to provide confidentiality and integrity, user authentication, secure network and transport layer communication, secure wireless communication, defeat vulnerabilities and electronic payment. Block chain is a distributed, decentralized public ledger. Block chain simply means chain of blocks. It means digital information (“the block”) stored in a public database (“the chain”).

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Identify** and inspect vulnerabilities In Block chain Concepts.	1	-	12
CO-2	**Apply** and **analyze** different cryptographic algorithms for secure data transmission using recent Tools. Block chain Application Components.	5	2	13,14
CO-3	**Analyze** the basics of Ethereum Development Tools	-	2	14
CO-4	**Discuss** electronic payment with help of Authentication and Authorization. Externally Owned Account(EOAs), Key pairs	-	-	2
CO-5	**Implement** the Cryptographic algorithms Compiling and Deploying a Contract. Working with EOA Accounts	-	-	5,13,14

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	3.0	1.6	-	-	2.0	-	-	-	-	-	-	1.0	1.0	1.0

Prerequisites: Network security and cryptography

Contents:

Unit-I

Introduction: Block chain Concepts, Block chain Evolution, Block chain structure, Block chain characteristics, Block chain Application example Escrow, Block chain stack, Block chain Decentralized Computation Platform-Ethereum, Decentralized Storage platform-Swarm, Decentralized Massaging platform-Whisper, Smart Contracts, Decentralized Applications, Tools and Interfaces, from Web 2.0 to the next generation decentralized web, Domain specific Block chain Applications, Internet of Things, Industrial and Manufacturing, Registry of Assets and Inventory, energy, Supply Chain and Logistics, Records and Identities, Healthcare, Block chain Benefits and Challenges. **10 Hrs**

Unit-II

Blockchain Application Templates: Block chain Application Components, Blockchain Application Components, Design Methodology for Block chain Applications, Blockchain Application Templates: Many-to-One, Many-to-One for IoT Applications, Many-to-Many or Peer-to-Peer, One-to-One for Financial Applications.

Cryptocurrency: Introduction, Bitcoin, Cryptocurrency Basics, Types, Usage

07 Hrs

Unit-III

Block chain Components and Applications: Setting-up Ethereum Development Tools, Ethereum Clients, Go-Ethereum Clien, Python Ehtereum Client(Python App), Ethereum Languages, Solidity, TestIRPC, Mist Ethereum Wallet, MetaMask, Web3 JavaScript API, Truffle.

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain **08 Hrs**

Unit-IV

Smart Contracts: Introduction, Smart Contract, Characteristics, Types, Smart Contracts in Ethereum, Smart Contracts in Industry.

07 Hrs

Unit-V

Private Blockchain System: Introduction, Characteristics, Need, Examples. Consortium Blockchain: Introduction, Characteristics, Need, Hyper ledger Platform, Case Study. **07 Hrs**

Reference Books:

1) ArshdeepBahga, Vijay Madisetti, "Block chain Applications: A Hands-On Approach" Universities Press, 1st Edition, 2019.
2) S. Chandramouli et al, "Blockchain Techology", 1/E, Universities Press, 2020
3) Kumar Saurabh and Ashutosh Saxena, "Blockchain Technology Concepts and Applications", 1st Edition.
4) The Block chain Developer A Practical Guide for Designing, Implementing, Publishing, Testing and Securing Distributed Blockchain Based Projects by EladElrom, 1st Edition.

22UISE722	Edge Computing	(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs): This course introduces students to the basics and importance of Edge Computing. It covers how edge systems work, their architecture, and key technologies like IoT, 5G, and virtualization. Students will learn about real-world applications in areas such as smart cities, healthcare, and industry. The course also looks at challenges like security and privacy, and discusses how to measure performance and explore new trends like Edge AI and federated learning.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs (1-12) / PSOs (13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Define** and **explain** the concepts, evolution, and role of edge computing in modern systems.	1	12	-
CO-2	**Describe** architectural models, components, and enabling technologies used in edge environments.	1	2,5	12
CO-3	**Identify** application domains and illustrate the role of edge computing in solving domain-specific problems.	-	1,2,3,5,12	10,11

CO-4	**Analyze** theoretical challenges related to security, privacy, and system governance in edge computing	-	1,2,4,6,12	7,8,10
CO-5	**Discuss** performance factors, limitations, and potential research directions in edge computing.	12	1,2,4,5	7

POs/PSOs	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	2.4	2.0	2.0	2.0	2.0	2.0	1.0	1.0	-	1.0	1.0	1.7	-	-

Prerequisites: Computer Networks, Cloud Computing Fundamentals

Contents:

Unit-I

Introduction to Edge Computing:

Evolution of computing paradigms: From Cloud to Fog to Edge, Definition and scope of Edge Computing, Edge vs. Cloud vs. Fog: Conceptual differences, Benefits, challenges, and limitations of Edge Computing, Edge Computing in the context of IoT **08 Hrs**

Unit-II

Architecture and Enabling Technologies:

Edge Computing architecture: devices, gateways, local processing, Components: Edge nodes, micro data centers, edge servers, Role of IoT, 5G, and embedded AI in enabling edge solutions, Virtualization and containerization (theory only), Communication protocols used in edge environments (MQTT, CoAP – theoretical overview) **08 Hrs**

Unit-III

Applications of Edge Computing: Edge Computing in smart cities, smart homes, Industrial IoT and manufacturing (Industry 4.0), Edge in healthcare and remote monitoring ,Retail and supply chain use cases, Role of edge in autonomous vehicles and robotics, Comparative analysis of cloud-based vs. edge-based applications (theoretical) **08 Hrs**

Unit-IV

Security, Privacy, and Governance Threat landscape in edge environment, Physical and network-level security risk, Data privacy concerns at the edge, Trust management, access control, and identity management, Regulatory issues and governance frameworks in edge computing **07 Hrs**

Unit-V

Performance, Challenges, and Future Directions Key performance metrics: latency, throughput, power, cost (analytical perspective),Theoretical overview of orchestration and resource management, Challenges in interoperability, standardization, and scalability, Future trends: Federated Learning, Swarm Intelligence, Edge-AI, Edge-cloud integration and synergy models, Research directions and open problems

08 Hrs

Reference Books:

1) Rajkumar Buyya, Satish Narayana Srirama, “Fog and Edge Computing: Principles and Paradigms”, Wiley, 2019.
2) Jie Cao, Quan Zhang, Weisong Shi ,"Edge Computing: A Primer", Springer, 2020.
3) F. Bonomi, R. Milito, "Edge Computing: Models, Technologies and Applications", Springer**, 2021.**

21UISE731	**Deep Learning**	**(3-0-0) 3**

Contact Hours: **39**

Course Learning Objectives (CLOs): Deep Learning is one of the most highly sought after skills in AI. In this course, students will learn the foundations of Deep Learning, understand how to build neural networks, and learn how to lead successful machine learning projects.

Course Outcomes (COs):

Description of the course outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Write** program using Scikit-learn, TensorFlow, PyTorch, Keras, etc.	1, 2	3, 13, 14	5, 12

CO-2	**Build, train, and apply** fully connected deep neural networks; implement efficient neural networks; and apply deep learning to real time applications.	5	1, 2	4, 12
CO-3	**Implement** Time Series Forecasting and Recurrent Neural Networks	1, 3, 5	13, 14	6
CO-4	**Demonstrate** object detection, image segmentation, and visual interpretation of convolutions.	1	2	6, 13, 14
CO-5	**Apply** deep learning knowledge and expertise to a real-world challenge. Develop and test a deep learning model.	4	1	12, 13, 14

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	2.6	2.3	2.5	2.0	2.3	1.0	-	-	-	-	-	1.0	1.5	1.5

Prerequisites:

1) Linear algebra
2) Statistics and probability

Contents:

Unit-I

Introduction to Deep Learning: Discover the basic concepts of deep learning such as neural networks and gradient descent. Implement a neural network in NumPy and train it using gradient descent with in-class programming exercises. Build a neural network to predict student admissions.

Introduction to PyTorch and TensorFlow. **07 Hrs**

Unit-II

Deep Learning with PyTorch and TensorFlow: Build your first neural network to classify images of clothing. Work through a set of Jupyter Notebooks to learn the major components of PyTorch. Load a pre-trained neural network to build a state-of-the-art image classifier.

Convolution Neural Networks: Build Convolution Neural Networks for state-of-the-art computer vision applications. Train a convolution network to classify dog breeds from images of dogs.

09 Hrs

Unit-III

Time Series Forecasting: Learn how to perform time series forecasting using deep learning and TensorFlow.

Recurrent Neural Networks: Build recurrent neural networks with PyTorch that can learn from sequential data such as natural language. Implement a network that learns from Tolstoy's Anna Karenina to generate new text based on the novel. **08 Hrs**

Unit-IV

Natural Language Classification: Implement a recurrent neural network that can classify text. Use your network to predict the sentiment of movie reviews.

Deploying with PyTorch / PyTorch : Build a chatbot and compile the network for deployment in a production environment. **08 Hrs**

Unit-V

Introduction to TensorFlow Lite: Learn how to deploy your models on Android, and IoT devices.

Capstone Project with Deep Learning using scikit-learn, TensorFlow, pytorch, etc. **07 Hrs**

Reference books:

1) Ian Good felllow, YoshuaBenjio, Aaron Courville, Deep Learning-, The MIT Press 2016.
2) Andrew W. Trask ,Grokking Deep Learning, Manning Publications, 2019.
3) Richard O. Duda, Peter E. Hart, David G. Stork, John Pattern Classification- Wiley & Sons Inc.
4) Chirstopher Bishop, Pattern Recognition and machine Learning 2007.

22UISO726	Cloud Computing	(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs): Cloud computing is one of the most relevant technical topics today, with broad-ranging effects across IT, Information Architecture, Business, Software Engineering, and Data Storage. It covers a series of current cloud computing technologies, including technologies for Infrastructure as a Service, Platform as a Service, Software as a Service, and Physical Systems as a Service. For different layers of the cloud technologies, practical solutions such as Google, Amazon, Microsoft, SalesForce.com, etc.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs (1-12)/ PSOs (13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Illustrate** the architecture and infrastructure of cloud computing.	1, 2	-	12
CO-2	**Explain** the core issues of cloud computing.	1	4	12
CO-3	**Choose** the appropriate technologies, algorithms, and approaches for the cloud related issues.	2	4, 5	13, 14
CO-4	**Illustrate** the appropriate cloud computing solutions and recommendations according to the applications used.	1	4	13, 14
CO-5	**Illustrate** recent advances in cloud computing.	1, 2	13, 5	12

POs/PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 13**	**PSO 14**
Mapping Level	3.0	3.0	-	2.0	2.0	-	-	-	-	-	-	1.0	1.0	1.0

Prerequisites:

1) Programming
2) Computer Networks.
3) Web 2.0

Contents:

Unit-I

Introduction to Cloud Computing: Introduction, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud-based Services & Applications

Cloud Concepts & Technologies: Virtualization, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring, Software Defined Networking, Network Function Virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing

08 Hrs

Unit-II

Cloud Services & Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment & Management Services, Identity & Access Management Services, Open Source Private Cloud Software

Hadoop & Map Reduce: Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, and Hadoop Cluster Setup. **07 Hrs**

Unit-III

Cloud Application Design: Introduction, Design Considerations for Cloud Applications, Reference Architectures for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

Testing, deployment, and operations in the cloud: Practical considerations. **08 Hrs**

Unit-IV

Cloud Application Development in Python: Design Approaches, Image Processing App, Document Storage App, MapReduce App, Social Media Analytics App.

Introduction to advanced topics: Multimedia Cloud, Cloud Application Benchmarking & Tuning. **08 Hrs**

Unit-V

Advanced Topics: Cloud Security, Cloud for Industry, Healthcare & Education, Containers, Dockers, and Kubernetes. **08 Hrs**

Reference books:

1) Dan C Marinescu, “Cloud Computing Theory and Practice”, 1/e, Elsevier (MK) 2013.
2) Cloud Computing: A Hands-On Approach by Arshdeep Bahga and Vijay Madisetti, Publisher: Universities Press India, 2014.

3) Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing Foundations and Applications Programming”, 2/e, Morgan Kaufmann, 2013.

4) Anthony T. Velte, “Cloud Computing A Practical Approach”, 1/e, McGraw Hill, 2010.

5) Michael Miller, “Cloud Computing”, 1/e, SAMS, 2008.

6)

22UISO741	Data Science	(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs): This course will enable students to define data science and its fundamentals demonstrate the process in data science, Explain machine learning algorithms necessary for data sciences, Illustrate the process of feature selection and analysis of data analysis algorithms and Visualize the data and follow of ethics.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Define** data science and its fundamentals.	-	-	4
CO-2	**Demonstrate** the process in data science.	-	3	-
CO-3	**Explain** machine learning algorithms necessary for data sciences.	-	3	-
CO-4	**Illustrate** the process of feature selection and analysis of data analysis algorithms.	-	2	-
CO-5	**Visualize** the data and follow the ethics.	1	-	-

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 13	PSO 14
Mapping Level	3.0	2.0	2.0	1.0	-	-	-	-	-	-	-	-	-	-

Prerequisites: Database Management Systems

Contents:

Unit-I

Introduction: What is Data Science? Big Data and Data Science hype – and getting past the hype, Why now? – Datafication, Current landscape of perspectives, Skill sets. Needed Statistical Inference: Populations and samples, Statistical modeling, probability distributions, fitting a model, - Introduction to R. **08 Hrs**

Unit-II

Exploratory Data Analysis and the Data Science Process: Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study: RealDirect (online real estate firm). Three Basic Machine Learning Algorithms: Linear Regression, kNearest Neighbors (k-NN), k-means.

08 Hrs

Unit-III

One More Machine Learning Algorithm and Usage in Applications: Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web. **10 Hrs**

Unit-IV

Feature Generation and Feature Selection (Extracting Meaning From Data): Motivating application: user (customer) retention. Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms. Filters; Wrappers; Decision Trees; Random Forests. Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system. **08 Hrs**

Unit-V

Mining Social-Network Graphs: Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs, Data Visualization: Basic principles, ideas and tools for data visualization. Data Science and Ethical Issues, Discussions on privacy, security, ethics, Next-generation data scientists. **07 Hrs**

Reference Books:

1) Doing Data Science Cathy O'Neil and Rachel Schutt Straight Talk From The Front line. O'Reilly 2014.
2) Mining of Massive Datasets. v2.1 Jure Leskovek, Anand Rajaraman and Jeffrey Ullman Cambridge University Press 2014.
3) Machine Learning: A Probabilistic Perspective Kevin P. Murphy 2013.
4) Data Mining: Concepts and Techniques Jiawei Han, Micheline Kamber and Jian Pei Third Edition 2012.

22UISO742	Supply Chain Management	(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs): The student will be able to: Understand the basic concepts of Supply Chain Management and identify SC drivers. Discuss the role of each SC drivers play and their impact on SC performance. Take simple SC and analyze it using concepts of SCM.

Course Outcomes (COs):

Description of the course outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Know** the basic concepts of SCM and list out the important drivers of SC.	1	-	12
CO-2	**Demonstrate** Management of Supply chain and its usage	2	4	10
CO-3	**Design** of supply chain components	3	5	13
CO-4	**Understand** tradeoffs, decisions and Revenue model in supply chain	3	6	8
CO-5	**Implement** IT Solutions and Co-ordination in supply chain.	5	9	14

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 13	PSO 14
Mapping Level	3.0	3.0	3.0	2.0	2.5	2.0	-	-	2.0	1.0	-	1.0	1.0	1.0

Prerequisites: Database, Data analytics

Contents:

Unit-I

Introduction to supply chain management: Supply chain basics (Definition of SC, Objectives of SC, SC stages, SC flows, SC Examples), decision phases in a supply chain (SC Strategy or Design, SC Planning and SC Operation), supply chain efficiency and responsiveness. Process view of a supply chain (Cycle view, Push/Pull View), Supply Chain Macro Processes in a firm, drivers of supply chain performance (Facilities, Inventory, Transportation, Information and Sourcing), Supply Chain performance: Competitive and supply chain strategies, achieving strategic fit**.** **08 Hrs**

Unit-II

Planning and Managing Inventories in a Supply Chain: Review of inventory concepts, Role of cycle inventory in a SC, Economies of scale to exploit fixed costs, Economics of scale to exploit quantity discounts, short-term discounting (Trade promotions). Role of safety inventory in a SC, safety inventory determination, Impact of supply uncertainty, aggregation and replenishment policies on safety inventory. **07 Hrs**

Unit-III

Designing distribution networks in a SC: Role of distribution in the SC, factors influencing distribution network design, Design options for distribution network, E-Business and the distribution network.

Transportation in a SC: Role of Transportation in a SC, Modes of transportation and their performance characteristics, Design options for a transportation network, tailored transportation, Trade-offs in transportation design, Risk management in transportation. **08 Hrs**

Unit-IV

Sourcing decisions in a SC: Role of sourcing in a SC, In-house and Outsource, supplier scoring & assessment, Supplier selection – Auctions and Negotiations, Contracts, Role of IT in sourcing.

Pricing and Revenue Management in a SC: Role of Pricing and Revenue Management in a supply chain, Pricing and Revenue management for Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts, Role of IT in pricing and revenue management. **08 Hrs**

Unit-V

Information Technology in a SC: The role of IT in a Supply Chain, The Supply Chain IT framework, CRM, ISCM, SRM, Transaction Management Foundation (TMF), Future of IT in 24 SC. The role of E-business in a supply chain, E-business framework, E-business in practice. Case discussion.

Co-ordination in a SC: Lack of SC Co-ordination and the Bullwhip effect, effect on performance of lack of co-ordination, Obstacles to Co-ordination in a SC. Managerial levers to achieve co-ordination. **08 Hrs**

Reference Books:

1) Sunil Chopra & Peter Meindl," Supply Chain Management – Strategy, Planning & Operation", Pearson Education Asia, ISBN: 9788120331587.
2) Robert B Hand field, Ernest L Nichols , Supply Chain Redesign – Transforming Supply Chains into Integrated Value Systems, 2002, Pearson Education Inc, ISBN: 81-297-0113-8
3) Jeremy F Shapiro, Duxbury, Modeling the Supply Chain, -Thomson Learning -2002, ISBN 0-534-37363.
4) David Simchi Levi, Philip Kaminsky& Edith Simchi Levi, Designing & Managing the Supply Chain - -McGraw Hill.

Software:

1) Introduction to Microsoft 365 and e2open software for supply chain management.

VIII SEMESTER

22UISL800	Technical Seminar	(0-0-2) 1

Contact Hours: 26

Technical Seminar: The students are expected to learn how to carry out literature survey to locate the state of the art technology in engineering domain of their interest. They are required to carry out selection of an emerging topic beyond the syllabus relevant to the branch of study, understand the concept, analyze and present effectively for 15-20 minutes followed by 5 minutes of questions and answers before their classmates and faculty. They can also present the technical innovative/novel work carried out in the laboratory. They are also required to learn the effective communication and modalities of technical interactions. Further, they have to submit the seminar material in the form of a paper in IEEE format. All the students are required to attend all the session throughout the semester.

Course Outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs (1-12) / PSOs (13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Demonstrate** an ability to present the work carried out both in written and oral form.	10	-	-
CO-2	**Demonstrate** an ability to incorporate rapid changes in technology by undergoing life-long learning	12	2	-

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	-	2.0	-	-	-	-	-	-	-	3.0	-	3.0	-	-

Procedure to conduct technical Seminar:

- All the students are informed to select a topic from the field of their interest from their branch or relevant to their branch and register the topic with the faculty (ies) In charge of Seminar.
- Two faculty members assigned to carry out this activity. The faculty members prepare the schedule of the seminar spread over the entire semester and display the same in the notice board.
- Change of seminar topic is not allowed once registered, however in the case of genuine reasons only once change of topic may be permitted.

- Based on the number of hours mentioned in the scheme, 4-6 students shall present the seminar in one slot of 2/3 hours.
- The faculty members shall conduct the seminar session every week as per the schedule in the slot mentioned on the time table and carry out the evaluation.
- Attendance is compulsory for all the students for all the seminars.
- The students are required to submit two hard copies of report not exceeding 6 pages and one soft copy of seminar report one week prior to their date of presentation.
- Report shall be in IEEE format viz A4 size paper, Title: Bold, Times new Roman Font 14, Sub heading & Body of the text: Times new Roman font 12. Margin for left should be 1 ½.
- Student name, USN, seminar date should be mentioned on the report.
- Presentation is for about 15-20 minutes, followed by 5 minutes for questions and answers.
- Typical evaluation methodology: The seminar shall be evaluated for maximum 50 marks. The breakup of marks shall be: Presentation:
  a) 40 marks b) Report: 10 marks.

For presentation, the following points not limited to may be considered.

- Concept, understanding, depth of the knowledge, originality of the topic, Quality of PPT, communication skills etc.
- For report evaluation, the following points not limited to may be considered
- Adherence to IEEE format, relevance of topic, subject depth and originality in writing etc.
- The seminar is aimed at as an educative program for the students. This is because, the students shall listen to 60- 70 seminars on different topics from emerging areas is as good as undergoing a course on latest happenings in the related branch of Engineering.

The departments going for Independent study in place of technical seminar shall plan, prepare the modalities and take the approval from Dean (AP)

The seminar is aimed at as an educative program for the students. This is because, the students shall listen to 60- 70 seminars on different topics from emerging areas is as good as undergoing a course on latest happenings in the related branch of Engineering.

22UISL801	Major Project - II / Internship	(12 Weeks)10

Contact Hours: **12 Weeks**

Course Learning Objectives (CLOs): Understand the domain, analyze through Modeling and Implementation through state of the art technology available .Know Software Engineering Principles: Modeling, Estimation, Design standards and architectural issues through use of Standards etc. To write modular programs and handle

exceptions to provide reliable solutions. To test and verify the programs for different scenarios.

Course Outcomes (COs):

Description of the course outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/PSOs(13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Identify, formulate** the problem statement and prepare software requirement specification (SRS)	2, 8, 13	1, 5, 11, 12	7
CO-2	**Design** specification using standard diagrams and tools.	3, 8, 13	1, 5, 11, 12	7
CO-3	**Implement** the system based on design specification using appropriate programming standards, tools, and practices.	8,13,14	1, 4, 5, 12	-
CO-4	**Verify and Validate** the given system using standard practices and tools.	8	1, 4, 5, 12	-
CO-5	**Communicate** effectively with and learn from, the experts from different domains.	8, 9, 10	5, 12	-

POs/PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO 11**	**PO 12**	**PSO 13**	**PSO 14**
Mapping Level	2.0	3.0	3.0	2.0	2.0	-	1.0	3.0	3.0	3.0	2.0	2.0	3.0	3.0

Major project phase- II: This work is normally the continuation from phase –1in which the students are expected to go for material collection, survey, visits, data collection, preliminary design, analysis, model development, code writing, field work etc. The same project team formed for phase –1 will continue the work under the guidance of the same faculty member. For all the projects, problems may be domain specific or interdisciplinary also in nature. A committee consisting of minimum 3 faculty members of which guide is a member shall evaluate at the end for CIE. The weightage of marks shall be 50% for the committee and 50% for the guide. In the case of interdisciplinary project work; one faculty from each department will guide the project and assess their department students.

Major Project - II / Internship

Evaluation and rubrics: There is a viva voce examination which shall be examined by two examiners one internal and one external to the college appointed by COE based on the suggestions by the respective HoD. The evaluation is to be done considering the parameters such as problem definition and its relevance, depth of knowledge, work carried out, quality of the report, Presentation & communication and interaction (question and answers) with preferably equal weightage to all parameters. However, the departments can have little flexibility in the rubrics based on the suitability. The students are required to submit a report on the project carried out.

Reference materials/books: The reference materials for the project work are as listed below but not limited to:

1. Engineering books.
2. Journals.
3. Manuals and data sheets.
4. Software packages.
5. Previous project reports.
6. Product information brochures.
7. Interaction with academia and industrial experts.
8. Internet etc.

Technical Seminar/ Independent study: The students are expected to learn how to carry out literature survey to locate the state of the art technology in engineering domain of their interest. They are required to carry out selection of an emerging topic beyond the syllabus relevant to the branch of study, understand the concept, analyze and present effectively for 15-20 minutes followed by 5 minutes of questions and answers before their classmates and faculty. They can also present the technical innovative/novel work carried out in the laboratory. They are also required to learn the effective communication and modalities of technical interactions. Further, they have to submit the seminar material in the form of a paper in IEEE format. All the students are required to attend all the session throughout the semester. The departments going for Independent study in place of technical seminar shall plan, prepare the modalities and take the approval from Dean (AP). **Evaluation and rubrics:** A committee consisting of minimum 3 faculty members shall evaluate for CIE considering the parameters such as topic and its relevance, depth of knowledge and understanding, quality of the report, Presentation & communication and interaction (question and answers) with preferably equal weightage to all parameters. However, the departments can have little flexibility in the rubrics based on the suitability. The students are required to submit a report on the project carried out.

22UISL802	Summer Internship	(4 weeks) 3

Contact Hours: 4 weeks

Course Learning Objectives (CLOs):

The internship module aims to provide the student with a practice-oriented and hands-on working experience in the real world or industry, and to enhance the student's learning experience i.e. to integrate theory and practice. It gives an opportunity to develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organizational setting. Also, to further develop and enhance operational, customer service, competency in specific areas related to student's area of career interest, skills in research, analysis and other life-long knowledge and skills in a real-world work environment. Through Internship, students can get pre-employment training and the company or organization can assess the performance of the student and may offer the student an employment opportunity after his/her graduation.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/ PSOs (13-14)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Solve** real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course.	1, 2	4	12
CO-2	**Communicate and collaborate** effectively and appropriately with different professionals in the work environment.	5,10	8	6,7,11,12
CO-3	**Demonstrate** critical thinking, problem-solving skills and creativity and innovation by analyzing underlying issue/s to challenges.	1,2,3,4,5,13,14	6,7,8	12
CO-4	**Demonstrate** the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s.	1,2,3,4,5,13,14	6,7,8	12

CO-5	**Demonstrate** an ability to work as a professional in a heterogeneous team environment.	9,10,11	8	12

POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 13	PSO 14
Mapping Level	3.0	3.0	3.0	2.6	3.0	1.6	1.6	2.0	3.0	3.0	2.0	1.0	3.0	3.0

The students are to undergo internship in Private industries/R&D organizations/Centers of Excellence/Laboratories of Reputed Institutions/Govt. & Semi Govt. organizations, PSUs, construction companies, entrepreneurial organizations, inter departments within the college etc. to get exposure to the external world for a period of 4 weeks in the summer vacation after VI sem and before start of VII semester. The students are to prepare a report on the internship work carried out. The internal faculty shall monitor the student and award CIE marks. There is a SEE in which the student shall present his work before a panel of examiners consisting of HoD, Guide and one faculty member during VII semester.

CIE and SEE Evaluation (from 2022-23 batch) CIE for Non-integrated Courses:
With LTP 3-0-0 and 4-0-0 or 2-2-0/3-2-0

- Two tests + One Improvement test : (20+20+20 each of one hour duration)
- Two higher scores from three tests are taken representing 40 marks
- QP pattern: 3 questions- Q.3 is compulsory and one question to be answered from Q.1 and Q.2, each question can be with maximum of two sub divisions.
- CTA: Minimum two components such as assignments, quiz, seminar, written assignment, any technical activity related to course etc. each of 5 marks. Total CTA marks- 10
- CIE= 40(from tests)+10(from CTA) = 50 marks
- SEE: Exam will be conducted for 100 marks with 3 hour's duration and will be scaled down to 50 marks. Five modules with built in choice. Each question can be with maximum of three sub divisions.

CIE for Integrated Courses: With LTP 2-0-2 and 3-0-2 and 2-2-2

Theory CIE component:

- Two tests + One Improvement test (20+20+20 each of one hour duration)
- Two higher scores from three tests are taken representing 40 marks
- QP pattern: 3 questions- Q.3 is compulsory and one question to be answered from Q.1 and Q.2, each question can be with maximum of two sub divisions.
- Practical CIE component (CTA): Laboratory component. 5 marks for conduction, regularity, involvement, journal etc. Lab Test -5 marks. A test as per the schedule announced will be conducted at the end for 50 marks and scaled down to 5 marks. If the performance is not satisfactory in laboratory the student shall be detained and required to reregister for the course as a whole whenever offered next.
- CIE= 40(from tests) +10(from CTA i.e. lab component) = 50 marks
- SEE: Exam will be conducted for 100 marks with 3 hour's duration and will be scaled down to 50 marks. Five modules with built in choice. Each question can be with maximum of three sub divisions. The questions shall be asked to test practical understanding for maximum of 30 marks.

CIE for AEC/HSMS/SDC Courses :With LTP 1-0-0 for 1 Credit

- CIE for 1 credit AEC/HSMS Courses with LTP 1-0-0
- Two tests + One Improvement test
- 20+20+20 each of one hour duration
- QP pattern for IA: MCQ 15 questions
- Two higher scores from three tests are taken representing 40 marks
- CTA: Minimum two components such as assignments ,quiz, seminar, written assignment , any learning activity related to the course etc. each of 5 marks.
- CIE= 40(from tests)+10(from CTA)= 50 marks
- SEE: Exam will be conducted for 50 marks with 1 hour duration. There will be 50 MCQs. The question paper will contain 10 MCQ questions from each module.