SIES Graduate School of Technology
RISE WITH EDUCATION

DEPARTMENT OF INFORMATION TECHNOLOGY

Course Outcomes
SE: III SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC301**
Course:	**Engineering Mathematics-III**
	Student should be able to:
CO-1	Find Laplace transform of functions using the properties.
CO-2	Find inverse Laplace transform using convolution theorem and partial fraction method
CO-3	Expand periodic functions using Fourier series, understand the concept of half range sine and cosine series and Parseval's Identity
CO-4	Apply the concept of complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic functions.
CO-5	Apply the concept of correlation and regression to find correlation coefficient, rank correlation and regression lines
CO-6	Find the probability using Baye's theorem, mean and variance of the probability distributions

Course Code:	**ITC302**
Course:	**Data Structure and Analysis**
	Student should be able to:
CO-1	Classify and apply the concepts of stacks, queues and linked list in real life problem solving.
CO-2	Classify, apply and analyze the concepts trees in real life problem solving.
CO-3	Illustrate and justify the concepts of graphs in real life problem solving.
CO-4	List and examine the concepts of sorting, searching techniques in real life problem solving.
CO-5	Use and identify the concepts of recursion, hashing in real life problem solving.
CO-6	Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.

Course Code:	**ITC303**
Course:	**DATABASE MANAGEMENT SYSTEM**
	Student should be able to:
CO-1	Identify the need of Database Management System.
CO-2	Design conceptual model for real life applications.
CO-3	Create Relational Model for real life applications.
CO-4	Formulate query using SQL commands.
CO-5	Apply the concept of normalization to relational database design.
CO-6	Demonstrate the concept of transaction, concurrency and recovery.

Course Code:	ITC304
Course:	**Principle of Communication**
	Student should be able to:
CO-1	Describe analog and digital communication systems
CO-2	Differentiate types of noise, analyses the Fourier transform of time and frequency domain.
CO-3	Design transmitter and receiver of AM, DSB, SSB and FM
CO-4	Describe Sampling theorem and pulse modulation systems.
CO-5	Explain multiplexing and digital band pass modulation techniques.
CO-6	Describe electromagnetic radiation and propagation of waves.

Course Code:	ITC305
Course:	**Paradigms and Computer Programming Fundamentals**
	Student should be able to:
CO-1	Describe and nd Compare different programming paradigms
CO-2	Describe the Object Oriented Constructs and use them in program design
CO-3	Explain the concepts of declarative programming paradigms through functional and logic programming
CO-4	Design and Develop programs based on declarative programming paradigm using functional and/or logic programming.
CO-5	Explain role of concurrency in parallel and distributed programming.
CO-6	Explain different application domains for use of scripting languages.

Course Code:	ITL301
Course:	**Data Structure Lab.**
	Student should be able to:
CO-1	Use the basic concepts and principles of various linked lists, stacks and queues.
CO-2	Apply the methods in basic trees.
CO-3	Use and identify the methods in advanced trees.
CO-4	Apply the methods in graphs.
CO-5	Apply the techniques of searching, hashing and sorting
CO-6	Illustrate and examine the methods of linked lists, stacks, queues, trees and graphs to various real time problems

Course Code:	ITL302
Course:	SQL LAB
	Student should be able to:
CO-1	Define problem statement and construct the conceptual model for real life application.
CO-2	Create and populate a RDBMS using SQL.
CO-3	Formulate and write SQL queries for efficient information retrieval.
CO-4	Apply view, triggers and procedures to demonstrate specific event handling.
CO-5	Demonstrate database connectivity using JDBC.
CO-6	Demonstrate the concept of concurrent transactions.

Course Code:	ITL303
Course:	Computer programming Paradigms Lab
	Student should be able to:
CO-1	Apply Object Oriented concepts in C++.
CO-2	Design and Develop solution based on declarative programming paradigm using functional and logic programming using Haskell
CO-3	Explain the multithreaded programs in Java and C++
CO-4	Describe the need and use of exception handling and garbage collection in C++ and JAVA
CO-5	Design and develop a solution to the same problem using multiple paradigms
CO-6	Compare the implementations in multiple paradigms at coding and execution level

Course Code:	ITL304
Course:	Java Lab (SBL)
	Student should be able to:
CO-1	Explain the fundamental concepts of Java Programing.
CO-2	Describe the concepts of classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
CO-3	Demonstrate how to extend java classes and achieve reusability using Inheritance, Interface and Packages.
CO-4	Construct robust and faster programmed solutions to problems using concept of Multithreading, exceptions and file handlingC
CO-5	Design and develop Graphical User Interface using Abstract Window Toolkit and Swings along with response to the events.
CO-6	Develop Graphical User Interface by exploring JavaFX framework based on MVC architecture

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Course Code:	ITM301
Course:	Mini Project –1 A for Front end /backend Application using JAVA
	Student should be able to:
CO-1	Identify and explain problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group and develop interpersonal skills to work as member of a group or leader
CO-3	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-4	Analyse the impact of solutions in societal and environmental context for sustainable development and use standard norms of engineering practices
CO-5	Excel in written and oral communication
CO-6	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning and Demonstrate project management principles during project work.

SE: IV SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC401**
Course:	**Engineering Mathematics-IV**
	Student should be able to:
CO-1	Apply the concepts of eigenvalues and eigenvectors in engineering problems.
CO-2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
CO-3	Apply the concept of Z- transformation and inverse in engineering problems.
CO-4	Use the concept of probability distribution and sampling theory to engineering problems.
CO-5	Apply the concept of Linear Programming Problems to optimization.
CO-6	Apply Non-Linear Programming Problems to engineering problems of optimization.

Course Code:	**ITC402**
Course:	**Computer Network and Network Design**
	Student should be able to:
CO-1	Describe the functionalities of each layer of the models and compare the Models
CO-2	Categorize the types of transmission media and explain data link layer concepts design issues and protocols
CO-3	Analyse the routing protocols and assign IP address to networks
CO-4	Explain the data transportation and session management issues and related protocols used for end-to-end delivery of data.
CO-5	List the data presentation techniques and illustrate the client/server model in application layer protocols.
CO-6	Use of networking concepts of IP address, Routing and application services to design a network for an organization

Course Code:	**ITC403**
Course:	**Operating System**
	Student should be able to:
CO-1	Explain the basic concepts related to Operating System.
CO-2	Describe the process management policies and illustrate scheduling of processes by CPU.
CO-3	Explain and apply synchronization primitives and evaluate deadlock conditionsas handled by Operating System.
CO-4	Describe and analyze the memory allocation and management functions of Operating System.
CO-5	Analyze and evaluate the services provided by Operating System for storage management

CO-6	Compare the functions of various special-purpose Operating Systems.

Course Code:	**ITC404**
Course:	**Automata Theory**
	Student should be able to:
CO-1	Design, construct, analyze and interpret regular languages, expression and grammars
CO-2	Design different types of finite automata and machines as acceptor, verifier and translator.
CO-3	Design, analyze and interpret context free languages, expression and grammars.Design, analyze and interpret context free languages, expression and grammars.
CO-4	Design different types of push down automata as simple parser
CO-5	Design different types of turing machines as acceptor, verifier, translator and basic computing machine.
CO-6	Develop understanding of applications of various Automat

Course Code:	**ITC405**
Course:	**Computer Organization & Architecture**
	Student should be able to:
CO-1	Demonstrate the fundamentals of Digital Logic Design
CO-2	Describe basic organization of computer, the architecture of 8086 microprocessor and implement assembly language programming for 8086 microprocessors.
CO-3	Demonstrate control unit operations and conceptualize instruction level parallelism.
CO-4	List and Identify integers and real numbers and perform computer arithmetic operations on integers.
CO-5	Categorize memory organization and explain the function of each element of a memory hierarchy.
CO-6	Examine different methods for computer I/O mechanism.

Course Code:	**ITL401**
Course:	**Network Lab**
	Student should be able to:
CO-1	Execute and evaluate network administration commands and demonstrate their use in different network scenarios
CO-2	Demonstrate the installation and configuration of network simulator.
CO-3	Demonstrate and measure different network scenarios and their performance behavior.
CO-4	Implement the socket programming for client server architecture.
CO-5	Analyze the contents the packet contents of different protocols.
CO-6	Design a network for an organization using a network design tool.

Course Code:	ITL402
Course:	UNIX LAB
	Student should be able to:
CO-1	Understand the architecture and functioning of Unix
CO-2	2. Identify the Unix general purpose commands
CO-3	3. Apply Unix commands for system administrative tasks such as file system management and user management.
CO-4	4. Execute Unix commands for system administrative tasks such as process management and memory management
CO-5	5. Implement basic shell scripts for different applications.
CO-6	6. Implement advanced scripts using awk & perl languages and grep, sed, etc. commands for performing various tasks.

Course Code:	ITL403
Course:	Microprocessor Lab
	Student should be able to:
CO-1	Demonstrate various components and peripheral of computer system
CO-2	Analyze and design combinational circuits
CO-3	Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
CO-4	Develop the assembly level programming using 8086 loop instruction set
CO-5	Write programs based on string and procedure for 8086 microprocessor.
CO-6	Design interfacing of peripheral devices with 8086 microprocessor.

Course Code:	ITL404
Course:	Python Lab (SBL)
	Student should be able to:
CO-1	Describe the structure, syntax, and semantics of the Python language.
CO-2	Explain advanced data types and functions in python
CO-3	illustrate the concepts of object-oriented programming as used in Python
CO-4	Create Python applications using modules, packages, multithreading and exception handling.
CO-5	Using File Handling programs ,also create GUI applications and evaluate database operations in python.
CO-6	Design and Develop cost-effective robust applications using the latest Python trends and technologies

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Course Code:	ITM401
Course:	Mini Project – 1 B for Python based automation projects
	Student should be able to:
CO-1	Identify and explain problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group and Develop interpersonal skills to work as member of a group or leader
CO-3	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-4	Analyse the impact of solutions in societal and environmental context for sustainable development and Use standard norms of engineering practices
CO-5	Excel in written and oral communication
CO-6	Demonstrate capabilities of self-learning in a group, which leads to life long learning and Demonstrate project management principles during project work.

TE: V SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC501**
Course:	**Internet Programming**
	Student should be able to:
CO-1	Select protocols or technologies required for various web applications.
CO-2	Apply JavaScript to add functionality to web pages.
CO-3	Design front end application using basic React.
CO-4	Design front end applications using functional components of React.
CO-5	Design back-end applications using Node.js.
CO-6	Construct web based Node.js applications using Express

Course Code:	**ITC502**
Course:	**Computer network security**
	Student should be able to:
CO-1	Explain the fundamentals concepts of computer security and network security.
CO-2	Identify the basic cryptographic techniques using classical and block encryption methods
CO-3	Study and describe the system security malicious software.
CO-4	Describe the Network layer security, Transport layer security and application layer security.
CO-5	Explain the need of network management security and illustrate the need for NAC.
CO-6	Identify the function of an IDS and firewall for the system security

Course Code:	**ITC503**
Course:	**Entrepreneurship & E-Business**
	Student should be able to:
CO-1	Explain the concept of entrepreneurship and its close relationship with enterprise and owner-management.
CO-2	Discuss the various aspects of Entrepreneurship development and leadership.
CO-3	Recognize the methods of Business Venture and analyze the important factors for business development.
CO-4	Identify the issues and decisions involved in financing and resourcing a business start-up.
CO-5	Describe various E-business Models and E-business Strategies.
CO-6	Discuss Strategic Initiatives for Technology contributing the overall development of Business.

Course Code:	ITC504
Course:	Software Engineering
	Student should be able to:
CO-1	Explain and use basic knowledge in software engineering.
CO-2	Identify requirements, analyze and prepare models.
CO-3	Plan, schedule and track the progress of the projects.
CO-4	Design & develop the software solutions for the growth of society.
CO-5	To demonstrate and evaluate real time projects with respect to software engineering principles.
CO-6	Apply testing and assure quality in software solution.

Course Code:	ITDO5012
Course:	Advance Data Management Technologies
	Student should be able to:
CO-1	Measure query costs and design alternate efficient paths for query execution.
CO-2	Apply sophisticated access protocols to control access to the database.
CO-3	Implement Distributed databases.
CO-4	Organize strategic data in an enterprise and build a data Warehouse.
CO-5	Analyse data using OLAP operations so as to take strategic decisions.
CO-6	Design modern applications using NoSQL databases.

Course Code:	ITDO5014
Course:	Advanced Data structure and Analysis
	Student should be able to:
CO-1	Understand the different methods for analysis of algorithms.
CO-2	Choose an appropriate advanced data structure to solve a specific problem
CO-3	Apply an appropriate algorithmic design approach for a given problem.
CO-4	Apply the dynamic programming technique to solve a given problem
CO-5	Select an appropriate pattern matching algorithm for a given application
CO-6	Understand the concepts of Optimization, Approximation and Parallel computing algorithms.

Course Code:	ITL501
Course:	IP Lab
	Student should be able to:
CO-1	Identify and apply the appropriate HTML tags to develop a webpage.
CO-2	Identify and apply the appropriate CSS tags to format data on webpage
CO-3	Construct responsive websites using Bootstrap
CO-4	Use JavaScript to develop interactive web pages.
CO-5	Construct front end applications using React
CO-6	Construct back end applications using Node.js/Express

Course Code:	ITL502
Course:	Security Lab
	Student should be able to:
CO-1	To apply the knowledge of symmetric cryptography to implement classical ciphers.
CO-2	To analyze and implement public key encryption algorithms, hashing and digital signature alogorithms.
CO-3	To explore the different network reconnaissance tools to gather information about networks.
CO-4	To explore the tools like sniffers, port scanners and other related tools for analyzing.
CO-5	To Scan the network for vulnerabilities and simulate attacks.
CO-6	To set up intrusion detection systems using open-source technologies and to explore email security.

Course Code:	ITL503
Course:	DevOps Lab
	Student should be able to:
CO-1	Learn the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements
CO-2	Obtain complete knowledge of the "version control system" to effectively track changes augmented with Git and GitHub
CO-3	Demonstrate the importance of Jenkins to Build and deploy Software Applications on server environment
CO-4	Learn the importance of Selenium and Jenkins to test Software applications
CO-5	Learn concept of containerization and Analyze the Containerization of OS images and deployment of applications over Docker
CO-6	Synthesize software configuration and provisioning using Puppet /Ansible.

Course Code:	ITL504
Course:	Advanced DevOps
	Student should be able to:
CO-1	Learn the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements
CO-2	Deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes
CO-3	apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure

CO-4	Identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques.
CO-5	Use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity
CO-6	Engineer a composition of nanoservices using AWS Lambda and Step Functions with the Serverless Framework

Course Code:	**ITL505**
Course:	**Professional Communication & Ethics-II**
	Student should be able to:
CO-1	Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
CO-2	Strategize their personal and professional skills to build a professional image and meet the demands of the industry
CO-3	Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
CO-4	Deliver persuasive and professional presentations
CO-5	Develop creative thinking and interpersonal skills required for effective professional communication
CO-6	Apply codes of ethical conduct, personal integrity and norms of organizational behavior.

Course Code:	**ITM501**
Course:	**Mini Project – 2 A Web Based Business Model**
	Student should be able to:
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group and develop interpersonal skills to work as member of a group or leader
CO-3	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-4	Analyse the impact of solutions in societal and environmental context for sustainable development using standard norms of engineering practices
CO-5	Excel in written and oral communication
CO-6	Demonstrate project management principles and capabilities of self-learning in a group, which leads to life long learning.

TE: VI SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC601**
Course:	**Data Mining and Business Intelligence**
	Student should be able to:
CO-1	Demonstrate an understanding of the importance of data warehousing and data mining and the principles of BI
CO-2	Organize and prepare the data needed for data mining using pre-processing techniques
CO-3	Perform exploratory analysis of the data to be used for mining.
CO-4	Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
CO-5	Define and apply metrics to measure the performance of various data mining algorithm
CO-6	Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.

Course Code:	**ITC602**
Course:	**Webx.0**
	Student should be able to:
CO-1	Understand the basic concepts related to web analytics and semantic web.
CO-2	Understand how TypeScript can help you eliminate bugs in your code and enable you to scale your code.
CO-3	Understand AngularJS framework and build dynamic, responsive single-page web applications.
CO-4	Apply MongoDB for frontend and backend connectivity using REST API.
CO-5	Apply Flask web development framework to build web applications with less code.
CO-6	Develop Rich Internet Application using proper choice of Framework.

Course Code:	**ITC603**
Course:	**Wireless Technology**
	Student should be able to:
CO-1	Describe the basic concepts of Wireless Network and Wireless Generations.
CO-2	Demonstrate and Evaluate the various Wide Area Wireless Technologies.
CO-3	Analyze the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies
CO-4	Appraise the importance of WPAN, WSN and Ad-hoc Networks.
CO-5	Analyze various Wireless Network Security Standards.

CO-6	Review the design considerations for deploying the Wireless Network Infrastructure.

Course Code:	**ITC604**
Course:	**AI and DS – 1**
	Student should be able to:
CO-1	Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
CO-2	Apply an appropriate problem-solving method and knowledge-representation scheme.
CO-3	Develop an ability to analyze and formalize the problem (as a state space, graph, etc.). They will be able to evaluate and select the appropriate search method.
CO-4	Apply problem solving concepts with data science and will be able to tackle them from a statistical perspective
CO-5	Choose and apply appropriately from a wider range of exploratory and inferential methods for analyzing data and will be able to evaluate and interpret the results contextually.
CO-6	Understand and apply types of machine learning methods for real world problems.

Course Code:	**ITDO6012**
Course:	**Image Processing**
	Student should be able to:
CO-1	Define image and explain formation of image and recall its types and calculate image parameters by reading images using a programming language.
CO-2	Apply and differentiate point, mask and histogram processing techniques suitable for enhancing images required for an applications.
CO-3	List and calculate discrete image transform coefficients and use it for enhancement, compression and representation.
CO-4	Compute compression ratio and fidelity criteria to evaluate and compare method efficiency and classify compression techniques into lossless and lossy methods.
CO-5	Apply the segmentation techniques to highlight and select the region of interest and determine and describe using chain code, shape number and moments for representing objects in an image.
CO-6	Choose structuring elements and apply morphological operations to find a suitable shape for an object in the image.

Course Code:	ITDO6014
Course:	Ethical Hacking and Forensic
	Student should be able to:
CO-1	Define the concept of ethical hacking.
CO-2	Recognize the need of digital forensics and define the concept of digital evidence and incident response.
CO-3	Apply the knowledge of computer forensics using different tools and techniques.
CO-4	Detect the network attacks and analyze the evidence.
CO-5	Apply the knowledge of computer forensics using different tools and techniques.
CO-6	List the method to generate legal evidence and supporting investigation reports

Course Code:	ITL601
Course:	BI LAB
	Student should be able to:
CO-1	Identify sources of Data for mining and perform data exploration
CO-2	Organize and prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files
CO-3	Implement the appropriate data mining methods like classification, clustering or association mining on large data sets using open-source tools like WEKA
CO-4	Implement various data mining algorithms from scratch using languages like Python/ Java etc.
CO-5	Evaluate and compare performance of some available BI packages
CO-6	Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support

Course Code:	ITL602
Course:	Web Lab
	Student should be able to:
CO-1	Understand open source tools for web analytics and semantic web apps development and deployment.
CO-2	Understand the basic concepts of TypeScript for designing web applications.
CO-3	Implement Single Page Applications using AngularJS Framework
CO-4	Develop Rich Internet Applications using AJAX.
CO-5	Create REST Web services using MongoDB.
CO-6	Design web applications using Flask.

Course Code:	ITL603
Course:	Sensor Lab
	Student should be able to:
CO-1	Differentiate between various wireless communication technologies based on the range of communication, cost, propagation delay, power and throughput.
CO-2	Conduct a literature survey of sensors used in real world wireless applications.
CO-3	Demonstrate the simulation of WSN using the Network Simulators (Contiki/ Tinker CAD/ Cup carbon etc).
CO-4	Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing
CO-5	Report and present the findings of the study conducted in the preferred domain
CO-6	Demonstrate the ability to work in teams and manage the conduct of the research study

Course Code:	ITL604
Course:	MAD AND PWA Lab
	Student should be able to:
CO-1	Learn cross platform mobile application development using Flutter framework
CO-2	Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation
CO-3	Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS
CO-4	Learn various PWA frameworks and their requirements
CO-5	Design and Develop a responsive User Interface by applying PWA Design techniques
CO-6	Develop and Analyse PWA Features and deploy it over app hosting solutions

Course Code:	ITL605
Course:	DS using Python Skill based Lab
	Student should be able to:
CO-1	Understand the concept of Data science process and associated terminologies to solve real-world problems
CO-2	Analyze the data using different statistical techniques and visualize the outcome using different types of plots.
CO-3	Analyze and apply the supervised machine learning techniques like Classification, Regression or Support Vector Machine on data for building the models of data and solve the problems.
CO-4	Apply the different unsupervised machine learning algorithms like Clustering, Decision Trees, Random Forests or Association to solve the

	problems.
CO-5	Design and Build an application that performs exploratory data analysis using Apache Spark
CO-6	Design and develop a data science application that can have data acquisition, processing, visualization and statistical analysis methods with supported machine learning technique to solve the real-world problem

Course Code:	**ITM601**
Course:	**Mini Project –2 BWeb Based on ML**
	Student should be able to:
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader.
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Demonstrate capabilities of self-learning in a group, which leads to life long learning.
CO-6	Demonstrate project management principles during project work.

BE: VII SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC701**
Course:	**AI and DS –II**
	Student should be able to:
CO-1	Design models for reasoning with uncertainty as well as the use of unreliable information
CO-2	Analyze the process of building a Cognitive application.
CO-3	Design fuzzy controller system.
CO-4	Apply learning concepts to develop real life applications.
CO-5	Evaluate performance of learning algorithms.
CO-6	Analyze current trends in Data Science.

Course Code:	**ITC702**
Course:	**Internet of Everything**
	Student should be able to:
CO-1	Describe the Characteristics and Conceptual Framework of IoT
CO-2	Differentiate between the levels of the IoT architectures.
CO-3	Analyze the IoT access technologies.
CO-4	Illustrate various edge to cloud protocol for IoT.
CO-5	Apply IoT analytics and data visualization.
CO-6	Analyze and evaluate IoT applications.

Course Code:	**ITDO7013**
Course:	**Infrastructure Security**
	Student should be able to:
CO-1	Understand the concept of vulnerabilities, attacks and protection mechanism
CO-2	Analyze and evaluate software vulnerabilities and attacks on databases and operating systems.
CO-3	Explain the need for security protocols in the context of wireless communication.
CO-4	Understand and explain various security solutions for Cloud infrastructure.
CO-5	Understand, and evaluate different attacks on Open Web Applications and Web services.
CO-6	Design appropriate security policies to protect infrastructure components.

Course Code:	**ITDLO7014**
Course:	**Software Testing and Quality Assurance**
	Student should be able to:
CO-1	Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
CO-2	Understand various software testing methods and strategies.
CO-3	Manage the testing process and testing metrics
CO-4	Understand fundamental concepts of software automation and use automation

	tools
CO-5	Apply the software testing techniques in the real time environment
CO-6	Use practical knowledge of a variety of ways to test software and an understanding of some of the trade-offs between testing techniques.

Course Code:	**ITDO7024**
Course:	**Information Retrieval System**
	Student should be able to:
CO-1	Define and describe the objectives of the basic concepts of the Information retrieval system.
CO-2	Evaluate the taxonomy of different information retrieval models.
CO-3	Try to solve and process text and multimedia retrieval queries and their operations.
CO-4	Evaluate text processing techniques and operations in the information retrieval system
CO-5	Demonstrate and evaluate various indexing and searching techniques
CO-6	Design the user interface for an information retrieval system.

Course Code:	**ITL701**
Course:	**Data Science Lab**
	Student should be able to:
CO-1	Implement reasoning with uncertainty
CO-2	Explore use cases of Cognitive Computing
CO-3	Implement a fuzzy controller system
CO-4	Develop real life applications using learning concepts
CO-5	Evaluate performance of applications.
CO-6	Implement and analyze applications based on current trends in Data Science

Course Code:	**ITL702**
Course:	**Internet of Everything Lab**
	Student should be able to:
CO-1	Identify the requirements for the real world problems
CO-2	Conduct a survey of several available literatures in the preferred field of study.
CO-3	Conduct a survey of several available literatures in the preferred field of study.
CO-4	Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing.
CO-5	To report and present the findings of the study conducted in the preferred domain.
CO-6	Demonstrate an ability to work in teams and manage the conduct of the research study

Course Code:	ITL703
Course:	Secure Application Development
	Student should be able to:
CO-1	Apply secure programming of application code.
CO-2	Understand the Owasp methodologies and standards
CO-3	Identify main vulnerabilities inherent in applications
CO-4	Apply Data Validation and Authentication for application
CO-5	Apply Security at Session Layer Management
CO-6	Apply secure coding for cryptography

Course Code:	ITL704
Course:	Recent Open Source Project Lab
	Student will be able to:
CO-1	Explain and apply the basic concepts of Open Source Software.
CO-2	Identify the difference between the GPL(General Public Licence) and Contribute to Open Source
CO-3	Apply and evaluate your knowledge for the Contribute to Open Source in different Operating System
CO-4	Apply and evaluate your knowledge for the Contribute to Open Source in different Technologies
CO-5	Apply and evaluate your knowledge for the Contribute to Open Source in different Network Management
CO-6	Apply and evaluate your knowledge for the Contribute to Open Source in different Applications and Services

Course Code:	ITM701
Course:	PROJECT-I
	Student should be able to:
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader.
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO-6	Use standard norms of engineering practices

Course Code:	ILO7013
Course:	Management Information System
	Student should be able to:
CO-1	Explain how information systems Transform Business
CO-2	Discuss the importance of Data and Knowledge Management.
CO-3	Analyse the various ethical issues and privacy concepts related to Information Systems.
CO-4	Examine the role of Social Computing in today's society.
CO-5	Describe how Computer Networks are backbones for Information Systems.
CO-6	Identify the types of systems used for enterprise-wide knowledge management and how they provide value for the business.

Course Code:	ILO7016
Course:	Cyber Security and Laws
	Student should be able to:
CO-1	Understand the concept of cybercrime and its effect on outside world
CO-2	Understand different cyber offences and cybercrime on different environment
CO-3	Analyse various tools used in performing cybercrime
CO-4	Understand the legal requirement of cyberspace
CO-5	Distinguish different aspects of cyber law
CO-6	Identify the need for different Information Security Standards compliance during software design and development

Course Code:	ILO7017
Course:	Disaster Management and Mitigation Measures
	Student should be able to:
CO-1	Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
CO-2	Plan of national importance structures based upon the previous history.
CO-3	Get acquainted with government policies, acts and various organizational structures associated with an emergency.
CO-4	Get to know the simple do's and don'ts in such extreme events and act accordingly

BE: VIII SEM (REV- 2019 'C' Scheme)

Course Code:	**ITC801**
Course:	**Blockchain and DLT**
	Student should be able to:
CO-1	Describe the basic concept of Blockchain and Distributed Ledger Technology.
CO-2	Interpret the knowledge of the Bitcoin network, nodes, keys, wallets and transactions
CO-3	Implement smart contracts in Ethereum using different development frameworks. 4 Develop applications in permissioned Hyperledger Fabric network
CO-4	Interpret different Crypto assets and Crypto currencies
CO-5	Analyze the use of Blockchain with AI, IoT and Cyber Security using case studies.
CO-6	Describe the basic concept of Blockchain and Distributed Ledger Technology.

Course Code:	**ITC8011**
Course:	**Big Data Analytics**
	Student should be able to:
CO-1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
CO-2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store, retrieve and process Big Data for Analytics.
CO-3	Implement several Data Intensive tasks using the Map Reduce Paradigm.
CO-4	Apply several newer algorithms for Clustering Classifying and finding associations in Big Data.
CO-5	Design algorithms to analyze Big data like streams, Web Graphs and Social Media data.
CO-6	Design and implement successful Recommendation engines for enterprises

Course Code:	**ITC8014**
Course:	**Knowledge Management**
	Student should be able to:
CO-1	Discuss KM, learning organizations, intellectual capital and related terminologies in clear terms and understand the role of knowledge management in organizations.
CO-2	Demonstrate an understanding of the history, concepts, and the antecedents of management of knowledge and describe several successful knowledge management systems.
CO-3	Evaluate the impact of technology including telecommunications, networks, and Internet/intranet role in managing knowledge.
CO-4	Discuss new jobs, roles and responsibilities resulting from the New or Knowledge
CO-5	Economy Ponder KM's current and future impact on individuals, organizations and society at large.
CO-6	Apply different tools for knowledge transfer and Business Intelligence in knowledge sharing.

Course Code:	ITDLO8021
Course:	User Interaction Design
	Student should be able to:
CO-1	Students will be able to identify and criticize bad features of interface designs.
CO-2	Students will be able to predict good features of interface designs
CO-3	Students will be able to illustrate and analyze user needs and formulate user design specifications
CO-4	Students will be able to interpret and evaluate the data collected during the process
CO-5	Students will be able to evaluate designs based on theoretical frameworks and methodological approaches.
CO-6	Students will be able to produce/show better techniques to improve the user interaction design interfaces.

Course Code:	ITDLO8024
Course:	Cloud Computing and Services
	Student should be able to:
CO-1	Explain the basics concepts of cloud computing like service models, deployment models and its architecture.
CO-2	Describe and apply virtualization in cloud computing.
CO-3	Use and Analyze different cloud computing services
CO-4	Understand and apply various services provided by Amazon Web Services cloud platform.
CO-5	Discuss the functionality of Openstack cloud platform & Sever less computing.
CO-6	Recognize and examine the security and privacy concerns in cloud computing.

Course Code:	ITL801
Course:	Blockchain Lab
	Student should be able to:
CO-1	Develop and test smart contract on local Blockchain
CO-2	Develop and test smart contract on Ethereum test networks.
CO-3	Write and deploy smart contract using Remix IDE and Metamask.
CO-4	Design and develop Cryptocurrency.
CO-5	Write and deploy chain code in Hyperledger Fabric.
CO-6	Develop and test a Full-fledged DApp using Ethereum/Hyperledger

Course Code:	ITL802
Course:	Cloud Computing Lab
	Student should be able to:
CO-1	Implement different types of virtualization techniques.
CO-2	Analyze various cloud computing service models and implement them to solve the given problems.
CO-3	Design and develop real world web applications and deploy them on commercial cloud(s).
CO-4	Explain major security issues in the cloud and mechanisms to address them.
CO-5	Explore various commercially available cloud services and recommend the appropriate one for the given application.
CO-6	Implement the concept of containerization

Course Code:	ITM805
Course:	Major Project – II
	Student should be able to:
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group. Develop interpersonal skills to work as member of a group or leader.
CO-3	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-4	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO-5	Use standard norms of engineering practices Excel in written and oral communication.
CO-6	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.

Course Code:	ILO8011
Course:	Project Management
	Student should be able to:
CO-1	Gain project management foundation and various organizational structures knowledge
CO-2	Apply selection criteria and select an appropriate project from different options
CO-3	Write work break down structure for a project and develop a schedule based on it.
CO-4	Identify opportunities and threats to the project and decide an approach to deal with them strategically
CO-5	Use Earned value technique and determine & predict status of the project
CO-6	Capture lessons learned during project phases and document them for future reference

Course Code:	ILO8012
Course:	Finance Management
	Student should be able to:
CO-1	Explain the importance and components of the Indian Financial System
CO-2	Estimate the risk & returns and present / future value of of various investments
CO-3	Describe corporate finance and significance of financial statements & ratio analysis
CO-4	Calculate capital budgeting using various investment appraisal criterias & also the working capital requirements
CO-5	Explain the various sources of finance and capital structure theories & approaches
CO-6	Describe the dividend policy theories & approaches

Course Code:	ILO8019
Course:	Environmental Management
	Student should be able to:
CO-1	Identify environmental Issues relevant to India and Global concerns.
CO-2	Understand and apply the concept of Environment Management and Sustainable development.
CO-3	Relate to the scope of Environment Management and identify career opportunities.
CO-4	Understand the concept of ecology, Ecosystem, its interdependence and food chain.
CO-5	Demonstrate awareness of environment related legislations.
CO-6	Develop awareness of EMS and ISO-14000.