*Course Outcomes of*
*Information Technology Department*
*Academic Year 2022-23*

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | | **SEMESTER – III** |
| ITC301 | ENGINEERING MATHEMATICS-III | CO1 | Learner will be able to apply the concepts of Laplace Transform & inverse Laplace transform to solve differential Equations. |
| | | CO2 | Learner will be able to apply the concepts of Fourier series to write the function in terms of sine and cosine terms. |
| | | CO3 | Learner will be able to apply the concept of complex variable to find orthogonal trajectory. |
| | | CO4 | Learner will be able to apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. |
| | | CO5 | Learner will be able to apply the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. |
| | | CO6 | Learner will be able to use the concept of higher Mathematics to solve Engineering Problems. |
| ITC302 | DATA STRUCTURE AND ANALYSIS | CO1 | Use and compare the concepts of stacks, queues and linked list, tree and graph. |
| | | CO2 | Apply and analyze the mechanism of trees in problem solving. |
| | | CO3 | Apply the concepts of graph structure in problem solving. |
| | | CO4 | Use and select the concepts of recursion, hashing techniques. |
| | | CO5 | Apply and analyze the concepts of sorting, searching techniques on sample data. |
| | | CO6 | Examine and use different methods of linear and non-linear data structure to demonstrate various applications. |
| ITC303 | DATABASE MANAGEMENT SYSTEM | CO1 | Apply Object Oriented concepts in C++. |
| | | CO2 | Demonstrate functional programming paradigm with Haskell. |
| | | CO3 | Implement solution based on declarative programming paradigm with Prolog. |
| | | CO4 | Illustrate run time program management. |
| | | CO5 | Identify the programming paradigm to develop the solution. |
| | | CO6 | Develop and compare the multiple paradigms at coding and execution level. |
| ITC304 | PRINCIPLE OF COMMUNICATION | CO1 | Explore various components of an analog & digital communication system. |
| | | CO2 | Identify different types of noise occurring in the system, its effects and different methods to minimize it. |
| | | CO3 | Describe the various methods of generation and detection for amplitude and frequency modulation. |
| | | CO4 | Exemplify the sampling theorem and summarize various pulse modulation techniques |
| | | CO5 | Explain the various methods of multiplexing and summarize the different digital bandpass modulation techniques. |
| | | CO6 | Describe the electromagnetic radiations and explain the |

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| | | | fundamentals of wave propagation. |
| ITC305 | PARADIGMS AND COMPUTER PROGRAMMING FUNDAMENTALS | CO1 | To use different programming paradigms and core language design Issues in computer programming. |
| | | CO2 | Apply the Object Oriented Concepts through program design. |
| | | CO3 | Apply the concepts of declarative programming paradigms through functional programming. |
| | | CO4 | Apply the concepts of declarative programming paradigms through logical programming |
| | | CO5 | Apply the role of concurrency in parallel and distributed programming. |
| | | CO6 | Apply the different problem domains for use of scripting languages |
| ITL301 | DATA STRUCTURE LAB | CO1 | Understand and use the basic concepts and principles of stacks and queues. |
| | | CO2 | Understand the concepts and apply the methods in basic linked lists. |
| | | CO3 | Use and identify the methods in tree and advanced trees. |
| | | CO4 | Understand the concepts and apply the methods in graphs. |
| | | CO5 | Understand the concepts and apply the techniques of searching, hashing and sorting |
| | | CO6 | Apply and implement applications by selecting proper data structures. |
| ITL302 | SQL LAB | CO1 | Remember basic concepts of database and SQL |
| | | CO2 | Demonstrate different models of database design |
| | | CO3 | Design models of database, construct queries in Relational Algebra and RDBMS using SQL. |
| | | CO4 | Evaluate queries in SQL to retrieve any type of information from a data base. |
| | | CO5 | Analyze and apply concepts of normalization to design database. |
| | | CO6 | Build TCL for a database |
| ITL303 | COMPUTER PROGRAMMING PARADIGMS LAB(CPL) | CO1 | Apply Object Oriented concepts in C++. |
| | | CO2 | Demonstrate functional programming paradigm with Haskell. |
| | | CO3 | Implement solution based on declarative programming paradigm with Prolog. |
| | | CO4 | Illustrate run time program management. |
| | | CO5 | Identify the programming paradigm to develop the solution. |
| | | CO6 | Develop and Compare the multiple paradigms at coding and execution level. |
| ITL304 | JAVA LAB (SBL) | CO1 | To install java environment and write a java program using fundamental concepts. |
| | | CO2 | Write a java program using the concepts of classes, objects, |

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| | | | members of a class and the relationships among them needed for a finding the solution to specific problem. |
| | | CO3 | Write a java program to achieve reusability using concept of Inheritance, Interface and Packages. |
| | | CO4 | Write a java program using the concept of Multithreading, exceptions and file handling to obtain robust and faster programmed solutions to problems. |
| | | CO5 | Design and develop Graphical User Interface using Abstract Window Toolkit and Swings along with response to the events. |
| ITM301 | MINI PROJECT – 1 A FOR FRONT END/BACKEND APPLICATION USING JAVA | CO1 | Identify problems based on societal /research needs. |
| | | CO2 | Apply Knowledge and skill to solve societal problems in a group. |
| | | CO3 | Develop interpersonal skills to work as member of a group or leader. |
| | | CO4 | Draw the proper inferences from available results through theoretical/ experimental/simulations. |
| | | CO5 | Analyze the impact of solutions in societal and environmental context for sustainable development. |
| | | CO6 | Demonstrate capabilities of self-learning in a group, which leads to lifelong learning. |
| SEMESTER – IV | | | |
| ITC401 | ENGINEERING MATHEMATICS-IV | CO1 | Learner will be be able to apply concepts of Matrix operations to solve Engineering problems. |
| | | CO2 | Learner will be be able to use the concepts of Complex Integration for evaluating integrals. |
| | | CO3 | Learner will be be able to apply the concept of Z-transformation and its inverse in engineering problems. |
| | | CO4 | Learner will be be able to apply the concept of probability distribution and sampling theory to Engineering Problems. |
| | | CO5 | Learner will be be able to apply the concept of Linear Programming to solve the optimization problems |
| | | CO6 | Learner will be be able to use the Non-Linear Programming techniques to solve the optimization problems |
| ITC402 | COMPUTER NETWORK AND NETWORK DESIGN | CO1 | Outline the functions of each layer in OSI and TCP/IP model and apply the fundamentals concepts of computer networking to different scenario |
| | | CO2 | Identify the types of transmission media with real time applications and describe data link layer concepts, design issues and protocols. |
| | | CO3 | Classify the routing protocols and investigate how to assign the IP addresses for the given network. |
| | | CO4 | Analyze the data transportation and session management issues and related protocols used for end to end delivery of data |
| | | CO5 | Identify data presentation techniques used in presentation layer and Illustrate the functions of application layer protocols. |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | CO6 | Design a network for an organization using networking concepts of IP address, Routing, and application services. |
| ITC403 | OPERATING SYSTEM | CO1 | Understand the basic concepts related to Operating System. |
| | | CO2 | Describe the process management policies and illustrate scheduling of processes by CPU. |
| | | CO3 | Explain and apply synchronization primitives and evaluate deadlock conditions as handled by Operating System. |
| | | CO4 | Describe and analyze the memory allocation and management functions of Operating System. |
| | | CO5 | Analyze and evaluate the services provided by Operating System for storage management. |
| | | CO6 | Compare the functions of various special-purpose Operating Systems. |
| ITC404 | AUTOMATA THEORY | CO1 | Learner will able to Recall and Write Regular languages, Expression and Grammars in Automata Theory. |
| | | CO2 | Learner will able to Analyze and Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator. |
| | | CO3 | Learner will able to Apply and derive Context Free languages and Grammars. |
| | | CO4 | Learner will able to Analyze and Design different types of PDA as simple parser. |
| | | CO5 | Learner will able to Analyze and Design different types of Turing machines as acceptor, verifier, translator and basic computing machine. |
| | | CO6 | Learner will able to Identify and summarize applications of various Automata. |
| ITC405 | COMPUTER ORGANIZATION AND ARCHITECTURE | CO1 | Recall and apply the fundamentals of Digital Logic Design |
| | | CO2 | Analyze the basic organization and architecture of computer including performance enhancement using instruction level parallelism. |
| | | CO3 | Use the Instruction set of 8086 architecture to Develop assembly language programs for given task for 8086 microprocessor . |
| | | CO4 | Select and Apply the algorithms to perform computer arithmetic operations. |
| | | CO5 | Analyze the organization of computer memory and different techniques for I/O data transfer |
| ITL401 | NETWORK LAB | CO1 | Execute and evaluate network administration commands and demonstrate their use in different network scenarios |
| | | CO2 | Demonstrate the installation and configuration of network simulator. |
| | | CO3 | Demonstrate and measure different network scenarios and their performance behavior. |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | CO4 | Implement the socket programming for client server architecture. |
| | | CO5 | Analyze the traffic flow of different protocols. |
| | | CO6 | Design a network for an organization using a network design tool |
| ITL402 | UNIX LAB | CO1 | Identify and apply basic general-purpose UNIX commands. |
| | | CO2 | Identify and apply Advanced UNIX commands. |
| | | CO3 | Implement basic shell script programs. |
| | | CO4 | Implement advance shell script programs. |
| | | CO5 | Implement Perl script programs. |
| | | CO6 | Study and implement AWK script. |
| ITL403 | MICROPROCESSOR LAB | CO1 | Recall the fundamentals of computer hardware. |
| | | CO2 | Use instruction set of 8086 microprocessor to write assembly language programs. |
| | | CO3 | Illustrate the use of digital interfaces. |
| | | CO4 | Analyze and design combinational circuits. |
| ITL404 | PYTHON LAB (SBL) | CO1 | To apply basic concepts of structure, syntax, and semantics of the Python language. |
| | | CO2 | Implement advanced data types and functions in python |
| | | CO3 | Apply the concepts of object-oriented programming as used in Python |
| | | CO4 | Create Python applications using modules, packages, multithreading and exception handling |
| | | CO5 | Implement File Handling programs, also create GUI applications and evaluate database operations in Python. |
| | | CO6 | develop cost-effective robust applications using the latest Python trends and technologies |
| ITM401 | MINI PROJECT – 1B | CO1 | Identify problems based on societal/research needs. |
| | | CO2 | Apply Knowledge and skill to solve societal problems in a group |
| | | CO3 | Develop interpersonal skills to work as member of a group or leader. |
| | | CO4 | Draw the proper inferences from available results through theoretical/ experimental/simulations. |
| | | CO5 | Analyze the impact of solutions in societal and environment context for sustainable development. |
| | | CO6 | Demonstrate capabilities of self -learning in a group, which leads to life long learning. |
| | **SEMESTER – V** | | |
| ITC501 | INTERNET PROGRAMMING | CO1 | Select protocols or technologies required for various web applications. |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | CO2 | Apply JavaScript to add functionality to web pages. |
| | | CO3 | Design front end application using basic React. |
| | | CO4 | Design front end applications using functional components of React. |
| | | CO5 | Design back-end applications using Node.js. |
| | | CO6 | Construct web based Node.js applications using Express. |
| ITC502 | COMPUTER NETWORK SECURITY | CO1 | Apply the fundamentals concepts of computer security and network security to different scenario. |
| | | CO2 | To describe and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication and message integrity |
| | | CO3 | To discuss and apply system security concept to recognize malicious code. |
| | | CO4 | To Apply network security basics and analyse the performance of security protocols. |
| | | CO5 | To identify the need of network management security and the need for NAC. |
| | | CO6 | To Identify functions of IDS and Firewall for the system security |
| ITC503 | ENTREPRENEURSHIP AND E-BUSINESS | CO1 | Illustrate and apply the concept of entrepreneur, entrepreneurship and outline the managerial and entrepreneurial approach towards operating a firm |
| | | CO2 | Apply the concept of entrepreneurial development, leadership and illustrate the MSMEs, corporate enterprise. |
| | | CO3 | Identify the important factors for starting a new venture and prepare a business plan and marketing plan. |
| | | CO4 | Examine the source of financing of business start-up, the process of venture capitalist, model the methods for management of venture and human resource |
| | | CO5 | Identify the technology incorporated in business, Commerce, the different E-business, E-commerce models along with globalization |
| | | CO6 | Identify the various strategic initiative for Technology in E-business |
| ITC504 | SOFTWARE ENGINEERING | CO1 | Illustrate use of basic knowledge in software engineering. |
| | | CO2 | Identify requirements, analyze and prepare models. |
| | | CO3 | Plan, schedule and track the progress of the projects. |
| | | CO4 | Design & develop the software solutions for the growth of society. |
| | | CO5 | To demonstrate and evaluate real time projects with respect to software engineering principles. |
| | | CO6 | Apply testing and assure quality in software solution. |
| ITL501 | IP LAB | CO1 | Identify and apply the appropriate HTML tags to develop a |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | | webpage. |
| | | CO2 | Identify and apply the appropriate CSS tags to format data on webpage. |
| | | CO3 | Construct responsive websites using Bootstrap. |
| | | CO4 | Use JavaScript to develop interactive web pages. |
| | | CO5 | Construct front end applications using React. |
| | | CO6 | Construct back end applications using Node.js/Express. |
| ITL502 | SECURITY LAB | CO1 | Illustrate symmetric cryptography by implementing classical ciphers. |
| | | CO2 | Demonstrate Digital signature, Cryptosystem methods |
| | | CO3 | Explore the different network reconnaissance tools to gather information about networks. |
| | | CO4 | Use tools like sniffers, port scanners and other related tools for analyzing packets in a network. |
| | | CO5 | Use open-source tools to scan the network for vulnerabilities and simulate attacks. |
| | | CO6 | Demonstrate the network security system using open source tools. |
| ITL 503 | DEVOPS LAB | CO1 | Illustrate the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements |
| | | CO2 | Demonstrate complete knowledge of the version control system to effectively track changes augmented with Git and GitHub |
| | | CO3 | Illustrate the importance of Jenkins to Build and deploy Software Applications on server environment |
| | | CO4 | Demonstrate the importance of Selenium and Jenkins to test Software Applications |
| | | CO5 | Illustrate concept of containerization and Analyze the Containerization of OS images and deployment of applications over Docker |
| | | CO6 | Synthesize software configuration and provisioning using Ansible. |
| ITDO 5014 | DEPARTMENT LEVEL OPTIONAL COURSE - ADVANCED DATA STRUCTURE AND ANALYSIS | CO1 | Apply mathematical aspects and fundamentals of AOA. |
| | | CO2 | Perform various operations on advanced data structures. |
| | | CO3 | Apply and analyze Divide and Conquer and Greedy algorithmic design techniques. |
| | | CO4 | Solve problems by using Dynamic Programming technique. |
| | | CO5 | Apply String Matching algorithms and Be aware of Advanced Algorithms. |
| ITL504 | ADVANCED DEVOPS LAB | CO1 | To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements |

| Subject Code | Subject Name | CO-ID | CO-Statement |
|---|---|---|---|
| | | CO2 | To deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes |
| | | CO3 | To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure |
| | | CO4 | To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques. |
| | | CO5 | To use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity |
| | | CO6 | To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework |
| ITL505 | PROFESSIONAL COMMUNICATION & ETHICS-II | CO1 | Learner will be able to communicate effectively and ethically in both oral and written forms. |
| | | CO2 | Learner will be able to possess the skill set required for successful employability and exhibit leadership skills. |
| | | CO3 | Learner will be able to develop an acumen to prepare for various competitive exams, as also prepare reports and presentations on topics pertaining to the wellbeing of society and the environment. |
| | | CO4 | Learner will be able to demonstrate knowledge of professional and personal etiquettes & ethics in the global environment. |
| ITM501 | MINI PROJECT 2A-WEB BASED BUSINESS MODEL | CO1 | Identify innovative problems with feasible solution based on understanding of societal /research needs. |
| | | CO2 | Analyze the system requirements, literature and existing systems |
| | | CO3 | Apply the Knowledge, skills, professional engineering practices and modern tools to design and formulate/develop solutions to societal problems |
| | | CO4 | Evaluate the impact of solutions in societal and environmental context for sustainable development. |
| | | CO5 | Demonstrate capabilities of effective oral and written communication, working individually and in a team leading to life long learning. |
| **SEMESTER- VI** | | | |
| ITC601 | DATA MINING & BUSINESS INTELLIGENCE | CO1 | Design data warehouse and apply OLAP operations for analysis of data. |
| | | CO2 | Use pre-processing techniques and perform exploratory analysis of the data for mining. |
| | | CO3 | Apply supervised learning algorithms to datasets. |
| | | CO4 | Apply unsupervised learning algorithms to datasets. |
| | | CO5 | Apply frequent Pattern mining on data sets to find association between item sets. |
| | | CO6 | Apply data mining for business case study/application |

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| ITC602 | WEB X.0 | CO1 | Know basic concepts related to web analytics and semantic web. |
| | | CO2 | use TypeScript to eliminate bugs in the program. |
| | | CO3 | Use AngularJS framework and build dynamic,responsive single-page web applications. |
| | | CO4 | Apply MongoDB for frontend and backend connectivity using REST API |
| | | CO5 | Apply Flask web development framework to build web applications with less code |
| | | CO6 | Develop Rich Internet Application using proper choice of Framework. |
| ITC603 | WIRELESS TECHNOLOGY | CO1 | Describe the basic concepts of Wireless Network and Wireless Generations |
| | | CO2 | Demonstrate and Evaluate the various Wide Area Wireless Technologies. |
| | | CO3 | Analyze the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies |
| | | CO4 | Appraise the importance of WPAN, WSN and Ad-hoc Networks. |
| | | CO5 | Analyze various Wireless Network Security Standards. |
| | | CO6 | Review the design considerations for deploying the Wireless Network Infrastructure. |
| ITC604 | AI AND DS – 1 | CO1 | The learner will be able to use basic features of Artificial Intelligence as presented in terms of intelligent agents. |
| | | CO2 | The learner will be able to interpret, analyze and apply the appropriate searching method. |
| | | CO3 | The learner will be able to apply an appropriate knowledge-representation scheme and to solve a planning problem. |
| | | CO4 | The learner will be able to interpret and apply data science concepts to statistical problem solving. |
| | | CO5 | The learner will be able to select and apply appropriate exploratory and inferential methods for analyzing data and interpret the results contextually. |
| | | CO6 | The learner will be able to apply types of machine learning methods for real world problems. |
| ITDO6014 | ETHICAL HACKING AND FORENSIC | CO1 | Define the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world. |
| | | CO2 | Summarize the methods to generate legal evidences and supporting investigation reports. |
| | | CO3 | Detect the network attacks and analyze the evidence. |
| | | CO4 | Apply the knowledge of computer forensics using different tools and techniques. |
| | | CO5 | Apply the knowledge of mobile forensics using different tools |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | | and techniques. |
| | | CO6 | Recognize the need of digital forensics and define the concept of digital evidence and incident response. |
| ITL601 | BI LAB | CO1 | Design Datawarehouse and perform the OLAP operations on cube |
| | | CO2 | Identify, organize and prepare the data needed for data mining algorithms. |
| | | CO3 | Implement the appropriate data mining methods like classification, clustering or association mining on large data set |
| | | CO4 | Implement various data mining algorithms from scratch using programming languages |
| | | CO5 | Evaluate and compare performance of some available BI packages |
| | | CO6 | Develop BI system to solve practical problems |
| ITL602 | WEB LAB | CO1 | Understand open-source tools for web analytics and semantic web apps development and deployment. |
| | | CO2 | Understand the basic concepts of TypeScript for designing web application. |
| | | CO3 | Implement Single Page Application using AngularJS Framework. |
| | | CO4 | Develop Rich Internet Application using AJAX. |
| | | CO5 | Create REST Web services using MongoDB. |
| | | CO6 | Design web Application using Flask. |
| ITL603 | SENSOR LAB | CO1 | Differentiate between various wireless communication technologies based on the range of communication, cost, propagation delay, power and throughput. |
| | | CO2 | Conduct a literature survey of sensors used in real world wireless applications. |
| | | CO3 | Demonstrate the simulation of WSN using the Network Simulators (Contiki/ Tinker CAD/ Cup carbon etc) |
| | | CO4 | Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing |
| | | CO5 | Report and present the findings of the study conducted in the preferred domain. |
| | | CO6 | Demonstrate the ability to work in teams and manage the conduct of the research study. |
| ITL604 | MAD & PWA LAB | CO1 | Examine cross platform mobile application development using Flutter framework. |
| | | CO2 | Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation. |
| | | CO3 | Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS. |
| | | CO4 | Examine various PWA frameworks and their requirements. |

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| | | CO5 | Design and Develop a responsive User Interface by applying PWA Design techniques. |
| | | CO6 | Develop and Analyze PWA Features and deploy it over app hosting solutions. |
| ITL605 | DS USING PYTHON SKILL BASED LAB | CO1 | Understand the concept of Data science process and associated terminologies to solve real-world problems |
| | | CO2 | Analyze the data using different statistical techniques and visualize the outcome using different types of plots. |
| | | CO3 | Analyze and apply the supervised machine learning techniques on data for building the models of data and solve the problems |
| | | CO4 | Apply the different unsupervised machine learning algorithms to solve the problems |
| | | CO5 | Design and Build an application that performs exploratory data analysis using Apache Spark |
| | | CO6 | 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 |
| ITM601 | MINI PROJECT 2B-BASED ON ML | CO1 | Identify innovative problems with feasible solution based on understanding of societal /research needs. |
| | | CO2 | Analyze the system requirements, literature and existing systems |
| | | CO3 | Apply the Knowledge, skills, professional engineering practices and modern tools to design and formulate/develop solutions to societal problems |
| | | CO4 | Evaluate the impact of solutions in societal and environmental context for sustainable development. |
| | | CO5 | Demonstrate capabilities of effective oral and written communication, working individually and in a team leading to life long learning. |
| **SEMESTER- VII** | | | |
| ITC 701 | AI AND DS II | CO1 | To know the concept of uncertainty and model a decision making for a new problem in an uncertain domain. |
| | | CO2 | To exhibit cognitive skills of artificial intelligence and analyze the process of building a Cognitive application. |
| | | CO3 | To aware the basics of Fuzzy Logic and Fuzzy Systems and design fuzzy controller system. |
| | | CO4 | To get to know the deep learning concepts, architectures and apply it to develop real life applications. |
| | | CO5 | To aware various advanced machine learning classification techniques & evaluate its performance. |
| | | CO6 | To analyze current trends in Data Science for real world problems. |

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| ITC702 | INTERNET OF EVERYTHING | CO1 | Describe the Characteristics and Conceptual Framework of IoT |
| | | CO2 | Differentiate between the levels of the IoT architectures |
| | | CO3 | Analyze the IoT access technologies |
| | | CO4 | Illustrate various edge to cloud protocol for IoT |
| | | CO5 | Apply IoT analytics and data visualization |
| | | CO6 | Analyze and evaluate IoT applications |
| ITDO7014 | SOFTWARE TESTING AND QA | CO1 | To Define basic concepts of software testing terminology and software testing life cycle . |
| | | CO2 | To Know and apply various software testing methods and strategies. |
| | | CO3 | To Illustrate the testing process and testing metrics for designing test case plan for software. |
| | | CO4 | To Summarize fundamental concepts of software automation and testing tools |
| | | CO5 | To apply the software testing techniques in the real time environment. |
| | | CO6 | To use variety of ways to test software and quality attributes. |
| ITDLO7024 | INFORMATION RETRIEVAL SYSTEM | CO1 | To know the basic concepts of the Information retrieval system. |
| | | CO2 | To aware, differentiate and apply the different information retrieval models. |
| | | CO3 | To apply and solve text and multimedia retrieval queries and their operations. |
| | | CO4 | To analyze text processing techniques and operations in the information retrieval system. |
| | | CO5 | To demonstrate and evaluate various indexing and searching techniques. |
| | | CO6 | To design the user interface for an information retrieval system |
| ILO7012 | RELIABILITY ENGINEERING | CO1 | A learner will be able to apply the concept of Probability theory to engineering problems. |
| | | CO2 | A learner will be able to apply various reliability concepts to calculate different reliability parameters. |
| | | CO3 | A learner will be able to illustrate the understanding of System Reliability. |
| | | CO4 | A learner will be able to illustrate reliability improvement techniques and System Reliability Analysis. |
| | | CO5 | A learner will be able to illustrate the various aspects of Maintainability, Availability and Failure Mode Effect and Criticality Analysis. |
| ILO7015 | OPERATION RESEARCH | CO1 | Apply and Summarize workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness. |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | CO2 | Analyse, Identify and Solve specialized LPP like transportation, assignment and dynamic programming problems. |
| | | CO3 | Select, Apply and Find the usage of Queuing Theory for solving engineering problems. |
| | | CO4 | Apply simulation method and usage of simulation in managerial decision making problems. |
| | | CO5 | Apply and Solve given problems using Game Theory. |
| | | CO6 | Select and Apply appropriate models and infer the outcome. |
| ILO 7016 | CYBER SECURITY AND LAWS | CO1 | To be aware about cybercrimes, information security and Indian IT Act 2000. |
| | | CO2 | To understand different types of cyberattacks and security measures to mitigate the attacks |
| | | CO3 | To understand different types of attacks and itÃ¢â¬â„¢s countermeasures |
| | | CO4 | To interpret IT laws in various legal issues |
| | | CO5 | To recognize and apply Indian IT Act and its amendments |
| | | CO6 | To recognize and apply information security compliances. |
| ILO 7017 | DISASTER MANAGEMENT AND MITIGATION MEASURES | CO1 | Students will be able to comprehend hazards, risks, vulnerability, capacities from social and technological, perspectives. |
| | | CO2 | Students will be able to recognize natural as well as man-made disaster and their extent along with its possible effects on the economy and dynamics of management. |
| | | CO3 | Students will be able to Comprehend national structures of development planning and disaster management based on previous history. |
| | | CO4 | Students will be able to describe the government policies, acts and various organizational structures associated with emergency. |
| | | CO5 | Students will be able to explain the simple dos and donts in extreme events and climate change for effective management of disasters. |
| ITL701 | DATA SCIENCE LAB | CO1 | Implement reasoning with uncertainty. |
| | | CO2 | Explore use cases of Cognitive Computing |
| | | CO3 | Implement a fuzzy controller system. |
| | | CO4 | Develop real life applications using Deep learning concepts. |
| | | CO5 | Evaluate performance of applications. |
| | | CO6 | Implement and analyze applications based on current trends in Data Science. |
| ITL702 | IOE LAB | CO1 | Identify the requirements for the real world problems |
| | | CO2 | Conduct a survey of several available literatures in the preferred field of study |

| Subject Code | Subject Name | CO-ID | CO-Statement |
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| | | CO3 | Study and enhance software/ hardware skills. |
| | | CO4 | Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing |
| | | CO5 | To report and present the findings of the study conducted in the preferred domain |
| | | CO6 | Demonstrate an ability to work in teams and manage the conduct of the research study. |
| ITL703 | SECURE APPLICATION DEVELOPMENT | CO1 | Apply secure programming of application code |
| | | CO2 | Understand the Owasp methodologies and standards. |
| | | CO3 | Identify main vulnerabilities inherent in applications |
| | | CO4 | Apply Data Validation and Authentication for application |
| | | CO5 | Apply Security at Session Layer Management |
| | | CO6 | Apply secure coding for cryptography |
| ITL704 | RECENT OPEN SOURCE PROJECT LAB | CO1 | Understand and apply the basic concepts of Open Source Software. |
| | | CO2 | Identify the difference between the GPL (General Public License) and Contribute to Open Source. |
| | | CO3 | Apply and evaluate your knowledge for the Contribute to Open Source in different Operating System. |
| | | CO4 | Apply and evaluate your knowledge for the Contribute to Open Source in different Technologies. |
| | | CO5 | Apply and evaluate your knowledge for the Contribute to Open Source in different Network Management. |
| | | CO6 | Apply and evaluate your knowledge for the Contribute to Open Source in different Applications and Services. |
| ITP701 | MAJOR PROJECT I | CO1 | Discover potential research areas in the field of IT |
| | | CO2 | To enable students to create very precise specifications of the IT solution to be designed. |
| | | CO3 | To introduce students to the vast array of literature available of the various research challenges in the field of IT |
| | | CO4 | To create awareness among the students of the characteristics of several domain areas where IT can be effectively used. |
| | | CO5 | To enable students to use all concepts of IT in creating a solution for a problem |
| | | CO6 | To improve the team building, communication and management skills of the students. |
| **SEMESTER- VIII** | | | |
| ITC801 | BLOCKCHAIN AND DLT | CO1 | Describe the basic concept of Blockchain and Distributed Ledger Technology. |
| | | CO2 | Interpret the knowledge of the Bitcoin network, nodes, keys, wallets and transactions |

| Subject Code | Subject Name | CO-ID | CO-Statement |
|---|---|---|---|
| | | CO3 | Implement smart contracts in Ethereum using different development frameworks. |
| | | CO4 | Develop applications in permissioned Hyperledger Fabric network |
| | | CO5 | Interpret different Crypto assets and Crypto currencies |
| | | CO6 | Analyze the use of Blockchain with AI, IoT and Cyber Security using case studies. |
| ITDO8011 | BIG DATA ANALYTICS | CO1 | Show the use of basic concepts of the big data analytics and identify main sources of big data in the real world |
| | | CO2 | Differentiate between different frameworks to efficiently handle big data for analytics |
| | | CO3 | Use the basic concepts of the big data analytics and Implement several Data Intensive tasks using the Map Reduce Paradigm |
| | | CO4 | Apply several advanced algorithms for Steam Big data mining. |
| | | CO5 | Apply several advanced algorithms for Clustering Classifying and finding associations in Big Data |
| | | CO6 | Apply algorithms to analyze Big data like streams, Web Graphs and Social Media data. |
| ITDLO8042 | CLOUD COMPUTING AND SERVICES | CO1 | Explain the basics concepts of cloud computing like service models, deployment models and its architecture |
| | | CO2 | Describe and apply virtualization in cloud computing. |
| | | CO3 | Use and Analyze different cloud computing services. |
| | | CO4 | Understand and apply various services provided by Amazon Web Services cloud platform. |
| | | CO5 | Discuss the functionality of Openstack cloud platform & Severless computing. |
| | | CO6 | Recognize and examine the security and privacy concerns in cloud computing. |
| ILO8011 | PROJECT MANAGEMENT | CO1 | Learner will be able to illustrate Project Life Cycles and PM Knowledge areas as per Project Management Institute. |
| | | CO2 | Learner will be able to apply different selection criteria to select an appropriate project from different options. |
| | | CO3 | Learner will be able to develop work break down structure for a Project and schedule based on it. |
| | | CO4 | Learner will be able to identify opportunities and threats to the project and decide an approach to deal with them strategically. |
| | | CO5 | Learner will be able to apply Earned Value Technique, determine and predict the status of the Project. |
| | | CO6 | Learner will be able to understand various types of Project termination methods and ethics in Projects. |
| ILO8013 | ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT | CO1 | Learner will be able to define the roles, responsibilities and functions to become a successful entrepreneur. |
| | | CO2 | Learner will be able to summarize business plans, business development and Importance of Capital to Entrepreneurship. |
| | | CO3 | Learner will be able to summarize Social and Women |

| Subject Code | Subject Name | CO-ID | CO-Statement |
|---|---|---|---|
| | | | entrepreneurship. |
| | | CO4 | Learner will be able to summarize different Acts and government policies for entrepreneurship. |
| | | CO5 | Learner will be able to summarize effective management of small and micro business. |
| ILO8018 | DIGITAL BUSINESS MANAGEMENT | CO1 | Students should be able to comprehend the concept of e - business contemporary trends and technology in digital business |
| | | CO2 | Students should be able to describe various agents of Ecommerce |
| | | CO3 | Students should be able to describe Digital business support services |
| | | CO4 | Students should be able to address security issues in Ecommerce and their counter measure s |
| | | CO5 | Students should be able to examine e-business strategy formulation for the development of a successful plan and presentation of digital transformation |
| ITL801 | BLOCKCHAIN LAB | CO1 | Develop and test smart contract on local Blockchain. |
| | | CO2 | Develop and test smart contract on Ethereum test networks. |
| | | CO3 | Write and deploy smart contract using Remix IDE and Metamask. |
| | | CO4 | Design and develop Cryptocurrency. |
| | | CO5 | Write and deploy chain code in Hyperledger Fabric. |
| | | CO6 | Develop and test a Full-fledged DApp using Ethereum/Hyperledger |
| ITL802 | CLOUD COMPUTING | CO1 | Implement different types of virtualization techniques. |
| | | CO2 | Analyze various cloud computing service models and implement them to solve the given problems. |
| | | CO3 | Implement various applications using various commercial cloud(s) services. |
| | | CO4 | Implement the concept of containerization. |
| ITP801 | MAJOR PROJECT II | CO1 | Graduate will able to demonstrate the product that is implemented. |
| | | CO2 | Graduate will able to develop the proper documentation of the work. |
| | | CO3 | Graduate will able to able to work in team and communicate with peers. |
| | | CO4 | Graduate will able to demonstrate usage of modern tools for the product that is implemented. |
| | | CO5 | Graduate will able to develop life long professional ethical values. |
| | | CO6 | Graduate will able to contribute to the social and environmental aspects |