

Department of Information Technology

Course Outcomes R-19 'C' Scheme

Course Name: Engineering Mathematics III

Course Code:ITC301

ITC301.1	Apply the concept of Laplace transform to solve the real integrals in engineering problems.
ITC301.2	Apply the concept of inverse Laplace transform of various functions in engineering problems.
ITC301.3	Expand the periodic function by using Fourier series for real life problems and complex engineering problems.
ITC301.4	Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.
ITC301.5	Apply the concept of Correlation and Regression to the engineering problems in data science, machine learning and AI.
ITC301.6	Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.

Course Name: Data Structure and Analysis

Course Code: ITC 302

ITC 302.1	Classify and Apply the concepts of stacks, queues and linked list in real life problem solving.
ITC 302.2	Classify, apply and analyze the concepts trees in real life problem solving.
ITC 302.3	Illustrate and justify the concepts of graphs in real life problem solving.
ITC 302.4	List and examine the concepts of sorting, searching techniques in real life problem solving.
ITC 302.5	Use and identify the concepts of recursion, hashing in real life problem solving.
ITC 302.6	Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.

Course Name: Database Management System

Course Code: ITC 303

ITC303.1	Identify the need of Database Management System.
ITC303.2	Design conceptual model for real life applications.
ITC303.3	Create Relational Model for real life applications
ITC303.4	Formulate query using SQL commands.
ITC303.5	Apply the concept of normalization to relational database design.
ITC303.6	Demonstrate the concept of transaction, concurrency and recovery.

Course Name: Principle of Communication

Course Code: ITC 304

ITC304.1	Describe analog and digital communication systems.
ITC304.2	Differentiate types of noise, analyses the Fourier transform of time and frequency domain.

ITC304.3	Design transmitter and receiver of AM, DSB, SSB and FM.
ITC304.4	Describe Sampling theorem and pulse modulation systems.
ITC304.5	Explain multiplexing and digital band pass modulation techniques.
ITC304.6	Describe electromagnetic radiation and propagation of waves.

Course Name: Paradigms and Computer Programming Fundamentals

Course Code: ITC 305

ITC305.1	Understand and Compare different programming paradigms.
ITC305.2	Understand the Object Oriented Constructs and use them in program design.
ITC305.3	Understand the concepts of declarative programming paradigms through functional and logic programming.
ITC305.4	Design and Develop programs based on declarative programming paradigm using functional and/or logic programming
ITC305.5	Understand the role of concurrency in parallel and distributed programming.
ITC305.6	Understand different application domains for use of scripting languages.

Course Name: Data Structure Lab

Course Code: ITL301

ITL301.1	Understand and use the basic concepts and principles of various linked lists, stacks and queues.
ITL301.2	Understand the concepts and apply the methods in basic trees.
ITL301.3	Use and identify the methods in advanced trees.
ITL301.4	Understand the concepts and apply the methods in graphs.
ITL301.5	Understand the concepts and apply the techniques of searching, hashing and sorting
ITL301.6	Illustrate and examine the methods of linked lists, stacks, queues, trees and graphs to various real time problems

Course Name: SQL Lab

Course Code: ITL302

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

Course Name:Computer programming Paradigms Lab

Course Code: ITL303	
ITL303.1	Implement Object Oriented concepts in C++.
ITL303.2	Design and Develop solution based on declarative programming paradigm using functional and logic programming.
ITL303.3	Understand the multi threaded programs in Java and C++
ITL303.4	Understand the need and use of exception handling and garbage collection in C++ and JAVA
ITL303.5	Implement a solution to the same problem using multiple paradigms.

ITL303.6	Compare the implementations in multiple paradigms at coding and execution level.
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Course Name: Java Lab (SBL)

Course Code: ITL304

ITL304.1	Explain the fundamental concepts of Java Programming.
ITL304.2	Use the concepts of classes, objects, members of a class and the relationships among them needed for finding the solution to specific problem.
ITL304.3	Demonstrate how to extend java classes and achieve reusability using Inheritance, Interface and Packages.
ITL304.4	Construct robust and faster programmed solutions to problems using concept of Multithreading, exceptions and file handling
ITL304.5	Design and develop Graphical User Interface using Abstract Window Toolkit and Swings along with response to the events.
ITL304.6	Develop Graphical User Interface by exploring JavaFX framework based on MVC architecture.

Course Name:ITM301

Course Code: Mini Project – 1 A for Front end /backend Application using JAVA

ITM301.1	Identify problems based on societal /research needs.
ITM301.2	Apply Knowledge and skill to solve societal problems in a group.
ITM301.3	Develop interpersonal skills to work as member of a group or leader.
ITM301.4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
ITM301.5	Analyse the impact of solutions in societal and environmental context for sustainable development.
ITM301.6	Use standard norms of engineering practices
ITM301.7	Excel in written and oral communication.
ITM301.8	Demonstrate capabilities of self-learning in a group, which leads to life long learning.
ITM301.9	Demonstrate project management principles during project work.

Course Name: Engineering Mathematics-IV

Course Code: ITC401

ITC401.1	Apply the concepts of eigen values and eigen vectors to solve engineering problems.
ITC401.2	Illustrate the use of concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
ITC401.3	Apply the concept of Z- transformation and its inverse in engineering problems.
ITC401.4	Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory.
ITC401.5	Apply the concept of Linear Programming to solve the optimization problems
ITC401.6	Use the Non-Linear Programming techniques to solve the optimization problems.

Course Name:Computer Network and Network Design

Course Code: ITC402

ITC402.1	Describe the functionalities of each layer of the models and compare the Models.
ITC402.2	Categorize the types of transmission media and explain data link layer concepts, design issues and protocols.
ITC402.3	Analyze the routing protocols and assign IP address to networks.
ITC402.4	Explain the data transportation and session management issues and related protocols used for end to end delivery of data.
ITC402.5	List the data presentation techniques and illustrate the client/server model in application layer protocols.

ITC402.6 Use of networking concepts of IP address, Routing, and application services to design a network for an organization

Course Name: Operating System

Course Code: ITC403

ITC403.1	Understand the basic concepts related to Operating System.
ITC403.2	Describe the process management policies and illustrate scheduling of processes by CPU.
ITC403.3	Explain and apply synchronization primitives and evaluate deadlock conditions as handled by Operating System.
ITC403.4	Describe and analyze the memory allocation and management functions of Operating System.
ITC403.5	Analyze and evaluate the services provided by Operating System for storage management.
ITC403.6	Compare the functions of various special-purpose Operating Systems.

Course Name: Automata Theory

Course Code: ITC404

ITC 404.1	Explain, analyze and design Regular languages, Expression and Grammars.
ITC 404.2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
ITC 404.3	Analyze and design Context Free languages and Grammars.
ITC 404.4	Design different types of Push down Automata as Simple Parser.
ITC 404.5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
ITC 404.6	Develop understanding of applications of various Automata.

Course Name: Computer Organization and Architecture

Course Code: ITC405

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

Course Name: Network Lab

Course Code: ITL401

ITL401.1	Execute and evaluate network administration commands and demonstrate their use in different network scenarios
ITL401.2	Demonstrate the installation and configuration of network simulator.
ITL401.3	Demonstrate and measure different network scenarios and their performance behavior.
ITL401.4	Implement the socket programming for client server architecture.
ITL401.5	Analyze the traffic flow of different protocols
ITL401.6	Design a network for an organization using a network design tool

Course Name: Unix Lab

Course Code: ITL402

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

Course Name: Microprocessor Lab

Course Code: ITL403

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

Course Name: Wireless Technology

Course Code: ITL404

ITL404.1	Understand the structure, syntax, and semantics of the Python language.
ITL404.2	Interpret advanced data types and functions in python
ITL404.3	illustrate the concepts of object-oriented programming as used in Python
ITL404.4	Create Python applications using modules, packages, multithreading and exception handling.
ITL404.5	Gain proficiency in writing File Handling programs ,also create GUI applications and evaluate database operations in python.
ITL404.6	Design and Develop cost-effective robust applications using the latest Python trends and technologies

Course Name: Mini Project – 1 B for Python based automation projects

Course Code: ITM401

ITM401.1	Identify problems based on societal /research needs.
ITM401.2	Apply Knowledge and skill to solve societal problems in a group.
ITM401.3	Develop interpersonal skills to work as member of a group or leader.
ITM401.4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
ITM401.5	Analyse the impact of solutions in societal and environmental context for sustainable development.
ITM401.6	Use standard norms of engineering practices
ITM401.7	Excel in written and oral communication.
ITM401.8	Demonstrate capabilities of self-learning in a group, which leads to life long learning.
ITM401.9	Demonstrate project management principles during project work.

Course Name: Internet Programming

Course Code: ITC501

ITC501.1	Select protocols or technologies required for various web applications.
ITC501.2	Apply JavaScript to add functionality to web pages.
ITC501.3	Design front end application using basic React.
ITC501.4	Design front end applications using functional components of React.
ITC501.5	Design back-end applications using Node.js.
ITC501.6	Construct web based Node.js applications using Express.

Course Name: Computer Network Security

Course Code: ITC502

ITC502.1	The basic concepts of computer and Network Security
ITC502.2	Various cryptographic algorithms including secret key management and different authentication techniques.
ITC502.3	Different types of malicious Software and its effect on the security.
ITC502.4	Various secure communication standards including IPsec, SSL/TLS and email.
ITC502.5	The Network management Security and Network Access Control techniques in Computer Security.
ITC502.6	Different attacks on networks and infer the use of firewalls and security protocols.

Course Name: Entrepreneurship and E-business

Course Code: ITC503

ITC503.1	Understand the concept of entrepreneurship and its close relationship with enterprise and owner-management.
ITC503.2	Understand the nature of business development in the context of existing organizations and of new business start-ups.
ITC503.3	Comprehended important factors for starting a new venture and business development
ITC503.4	Know issues and decisions involved in financing and resourcing a business start-up
ITC503.5	Describe various E-business Models
ITC503.6	Discuss various E-business Strategies.

Course Name: Software Engineering

Course Code: ITC504

ITC504.1	Understand and use basic knowledge in software engineering.
ITC504.2	Identify requirements, analyze and prepare models.
ITC504.3	Plan, schedule and track the progress of the projects.
ITC504.4	Design & develop the software solutions for the growth of society
ITC504.5	To demonstrate and evaluate real time projects with respect to software engineering principles
ITC504.6	Apply testing and assure quality in software solution

Course Name: IP Lab

Course Code: ITL501

ITL501.1	Identify and apply the appropriate HTML tags to develop a webpage.
ITL501.2	Identify and apply the appropriate CSS tags to format data on webpage

ITL501.3	Construct responsive websites using Bootstrap
ITL501.4	Use JavaScript to develop interactive web pages.
ITL501.5	Construct front end applications using React
ITL501.6	Construct back end applications using Node.js/Express

Course Name: Security Lab

Course Code: ITL502

ITL502.1	Illustrate symmetric cryptography by implementing classical ciphers.
ITL502.2	Demonstrate Key management, distribution and user authentication.
ITL502.3	Explore the different network reconnaissance tools to gather information about networks
ITL502.4	Use tools like sniffers, port scanners and other related tools for analyzing packets in a network
ITL502.5	Use open-source tools to scan the network for vulnerabilities and simulate attacks
ITL502.6	Demonstrate the network security system using open source tools

Course Name: DevOPs Lab

Course Code: ITL503

ITL503.1	To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements
ITL503.2	To obtain complete knowledge of the “version control system” to effectively track changes augmented with Git and GitHub
ITL503.3	To understand the importance of Jenkins to Build and deploy Software Applications on server environment
ITL503.4	Understand the importance of Selenium and Jenkins to test Software Applications
ITL503.5	To understand concept of containerization and Analyze the Containerization of OS images and deployment of applications over Docker
ITL503.6	To Synthesize software configuration and provisioning using Ansible.

Course Name: Advance DevOps Lab

Course Code: ITL504

ITL504.1	To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements
ITL504.2	To deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes
ITL504.3	To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure.
ITL504.4	To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques.
ITL504.5	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
ITL504.6	To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework

Course Name: Professional Communication & Ethics-II (PCE-II)

Course Code: ITL505

ITL505.1	plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
ITL505.2	strategize their personal and professional skills to build a professional image and meet the demands of the industry.
ITL505.3	emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.

ITL505.4	deliver persuasive and professional presentations.
ITL505.5	develop creative thinking and interpersonal skills required for effective professional communication
ITL505.6	apply codes of ethical conduct, personal integrity and norms of organizational behaviour.

Course Name: Mini Project – 2 A Web Based Business Model

Course Code: ITM501

ITM501.1	Identify problems based on societal /research needs.
ITM501.2	Apply Knowledge and skill to solve societal problems in a group.
ITM501.3	Develop interpersonal skills to work as member of a group or leader.
ITM501.4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
ITM501.5	Analyse the impact of solutions in societal and environmental context for sustainable development.
ITM501.6	Use standard norms of engineering practices
ITM501.7	Excel in written and oral communication.
ITM501.8	Demonstrate capabilities of self-learning in a group, which leads to life long learning.
ITM501.9	Demonstrate project management principles during project work.

Course Name: Microcontroller Embedded Programming

Course Code: ITDO5011

ITDO5011.1	Introduce and discuss the embedded system concepts, architecture of embedded systems and understand the embedded development environments
ITDO5011.2	Describe the architecture of 8051 microcontroller and write embedded programs for 8051Microcontroller
ITDO5011.3	Illustrate the interfacing of peripherals with 8051 microcontroller and write programs
ITDO5011.4	Understand and apply the concepts of ARM architecture
ITDO5011.5	Explain and Demonstrate the open source RTOS
ITDO5011.6	Select the embedded platform and program it for real time application

Course Name: Advance Data Management Technologies

Course Code: ITDO5012

ITDO5012.1	Measure query costs and design alternate efficient paths for query execution.
ITDO5012.2	Apply sophisticated access protocols to control access to the database.
ITDO5012.3	Implement Distributed databases.
ITDO5012.4	Organize strategic data in an enterprise and build a data Warehouse.
ITDO5012.5	Analyse data using OLAP operations so as to take strategic decisions.
ITDO5012.6	Design modern applications using NoSQL databases. databases.

Course Name: Computer Graphics & Multimedia System

Course Code: ITDO5013

ITDO5013.1	Describe the basic concepts of Computer Graphics.
ITDO5013.2	Demonstrate various algorithms for basic graphics primitives.
ITDO5013.3	Apply 2-D geometric transformations on graphical objects. Use various Clipping algorithms on graphical objects

ITDO5013.4	Explore 3-D geometric transformations and curve representation techniques.
ITDO5013.5	Describe the basics of Multimedia System
ITDO5013.6	Explore the Digital images audio & video and their related concepts.

Course Name: Advanced Data structure and Analysis

Course Code: ITDO5014

ITDO5014.1	Understand the different methods for analysis of algorithms.
ITDO5014.2	Choose an appropriate advanced data structure to solve a specific problem.
ITDO5014.3	Apply an appropriate algorithmic design approach for a given problem.
ITDO5014.4	Apply the dynamic programming technique to solve a given problem.
ITDO5014.5	Select an appropriate pattern matching algorithm for a given application.
ITDO5014.6	Understand the concepts of Optimization, Approximation and Parallel computing algorithms.

Course Name: Data Mining & Business Intelligence

Course Code: ITC601

ITC601.1	Demonstrate an understanding of the importance of data warehousing and data mining and the principles of business intelligence
ITC601.2	Organize and prepare the data needed for data mining using pre preprocessing techniques.
ITC601.3	Perform exploratory analysis of the data to be used for mining.
ITC601.4	Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
ITC601.5	Define and apply metrics to measure the performance of various data mining algorithms.
ITC601.6	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 Name: Web X.0

Course Code: ITC602

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

Course Name: Wireless Technology

Course Code: ITC603

ITC603.1	Describe the basic concepts of Wireless Network and Wireless Generations.
ITC603.2	Demonstrate and Evaluate the various Wide Area Wireless Technologies.
ITC603.3	Analyze the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies
ITC603.4	Appraise the importance of WPAN, WSN and Ad-hoc Networks.
ITC603.5	Analyze various Wireless Network Security Standards.
ITC603.6	Review the design considerations for deploying the Wireless Network Infrastructure.

Course Name: AI and DS - 1

Course Code: ITC604

ITC604.1	Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
ITC604.2	Apply an appropriate problem-solving method and knowledge-representation scheme.
ITC604.3	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.
ITC604.4	Apply problem solving concepts with data science and will be able to tackle them from a statistical perspective.
ITC604.5	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.
ITC604.6	Understand and apply types of machine learning methods for real world problems.

Course Name: Business Intelligence Lab

Course Code: ITL601

ITL601.1	Identify sources of Data for mining and perform data exploration
ITL601.2	Organize and prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files
ITL601.3	Implement the appropriate data mining methods like classification, clustering or association mining on large data sets using open-source tools like WEKA
ITL601.4	Implement various data mining algorithms from scratch using languages like Python/ Java etc.
ITL601.5	Evaluate and compare performance of some available BI packages
ITL601.6	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 Name: Web Lab

Course Code: ITL602

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

Course Name: Sensor Lab

Course Code: ITL603

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

Course Name: MAD & PWA Lab

Course Code: ITL604

ITL604.1	Understand cross platform mobile application development using Flutter framework
ITL604.2	Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation
ITL604.3	Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS
ITL604.4	Understand various PWA frameworks and their requirements
ITL604.5	Design and Develop a responsive User Interface by applying PWA Design techniques
ITL604.6	Develop and Analyse PWA Features and deploy it over app hosting solutions

Course Name: DS using Python Lab

Course Code: ITL605

ITL605.1	Understand the concept of Data science process and associated terminologies to solve real-world problems
ITL605.2	Analyze the data using different statistical techniques and visualize the outcome using different types of plots.
ITL605.3	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.
ITL605.4	Apply the different unsupervised machine learning algorithms like Clustering, Decision Trees, Random Forests or Association to solve the problems.
ITL605.5	Design and Build an application that performs exploratory data analysis using Apache Spark
ITL605.6	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 Name: Mini Project – 2 B Web Based on ML

Course Code: ITM601

ITM601.1	Identify problems based on societal /research needs.
ITM601.2	Apply Knowledge and skill to solve societal problems in a group.
ITM601.3	Develop interpersonal skills to work as member of a group or leader.
ITM601.4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
ITM601.5	Analyse the impact of solutions in societal and environmental context for sustainable development.
ITM601.6	Use standard norms of engineering practices
ITM601.7	Excel in written and oral communication.
ITM601.8	Demonstrate capabilities of self-learning in a group, which leads to life long learning.
ITM601.9	Demonstrate project management principles during project work.

Course Name: Software Architecture

Course Code: ITDO6011

ITDO6011.1	Understand the need of software architecture for sustainable dynamic systems.
ITDO6011.2	Have a sound knowledge on design principles and to apply for large scale systems.
ITDO6011.3	Apply functional and non-functional requirements
ITDO6011.4	Design architectures for distributed, network and heterogeneous systems
ITDO6011.5	Have good knowledge on service oriented and model driven architectures and the aspect-oriented architecture.
ITDO6011.6	Have a working knowledge to develop appropriate architectures through various case studies.

Course Name: Image Processing

Course Code: ITDO6012

ITDO6012.1	Define image and explain formation of image and recall its types and calculate image parameters by reading images using a programming language.
ITDO6012.2	Apply and differentiate point, mask and histogram processing techniques suitable for enhancing images required for an application.
ITDO6012.3	List and calculate discrete image transform coefficients and use it for enhancement, compression and representation.
ITDO6012.4	Compute compression ratio and fidelity criteria to evaluate and compare method efficiency and classify compression techniques into lossless and lossy methods
ITDO6012.5	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.
ITDO6012.6	Choose structuring elements and apply morphological operations to find a suitable shape for an object in the image.

Course Name: Green IT

Course Code: ITDO6013

ITDO6013.1	Describe awareness among stakeholders and promote green agenda and green initiatives in their working environments leading to green movement
ITDO6013.2	Identify IT Infrastructure Management and Green Data Centre Metrics for software development
ITDO6013.3	Recognize Objectives of Green Network Protocols for Data communication.
ITDO6013.4	Use Green IT Strategies and metrics for ICT development.
ITDO6013.5	Illustrate various green IT services and its roles.
ITDO6013.6	Use new career opportunities available in IT profession, audits and others with special skills such as energy efficiency, ethical IT assets disposal, carbon footprint estimation, reporting and development of green products, applications and services.

Course Name: Ethical Hacking and Forensics

Course Code: ITDO6014

ITDO6014.1	Define the concept of ethical hacking.
ITDO6014.2	Recognize the need of digital forensics and define the concept of digital evidence and incident response.
ITDO6014.3	Apply the knowledge of computer forensics using different tools and techniques
ITDO6014.4	Detect the network attacks and analyze the evidence.
ITDO6014.5	Apply the knowledge of computer forensics using different tools and techniques
ITDO6014.6	List the method to generate legal evidence and supporting investigation reports

Course Name : AI and DS –II

Course Code: ITC701

ITC701.1	Understand the customer requirements and Apply a Methodology to Network Design
ITC701.2	Structure and Modularize the Network
ITC701.3	Design Basic Campus and Data Center Network.
ITC701.4	Design Remote Connectivity
ITC701.5	Design IP Addressing and Select suitable Routing Protocols for the Network
ITC701.6	Compare Openflow controllers and switches with other enterprise networks.

Course Name: Internet of Everything

Course Code: ITC702

ITC702.1	Describe the Characteristics and Conceptual Framework of IoT.
ITC702.2	To understand levels of the IoT architectures
ITC702.3	To correlate the connection of smart objects and IoT access technologies
ITC702.4	To Interpret edge to cloud protocols
ITC702.5	To explore data analytics and data visualization on IoT Data
ITC702.6	To explore IoT applications.

Course Name: Data Science Lab

Course Code: ITL701

ITC701.1	Implement reasoning with uncertainty
ITC701.2	Explore use cases of Cognitive Computing
ITC701.3	Implement a fuzzy controller system
ITC701.4	Develop real life applications using learning concepts.
ITC701.5	Evaluate performance of applications
ITC701.6	Implement and analyze applications based on current trends in Data Science.

Course Name: Internet of Everything Lab

Course Code: ITL702

ITL702.1	Identify the requirements for the real world problems.
ITL702.2	Conduct a survey of several available literatures in the preferred field of study.
ITL702.3	Study and enhance software/ hardware skills
ITL702.4	Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing.
ITL702.5	To report and present the findings of the study conducted in the preferred domain.
ITL702.6	Demonstrate an ability to work in teams and manage the conduct of the research study

Course Name: Secure Application Development

Course Code: ITL703

ITDLO7035.1	Apply secure programming of application code.
ITDLO7035.2	Understand the Owasp methodologies and standards.
ITDLO7035.3	Identify main vulnerabilities inherent in applications.
ITDLO7035.4	Apply Data Validation and Authentication for application
ITDLO7035.5	Apply Security at Session Layer Management
ITDLO7035.6	Apply secure coding for cryptography.

Course Name: Recent Open Source Project Lab

Course Code: ITL704

ITL704.1	Understand and apply the basic concepts of Open Source Software.
ITL704.2	Identify the difference between the GPL(General Public Licence) and Contribute to Open Source
ITL704.3	Apply and evaluate your knowledge for the Contribute to Open Source in different Operating System.

ITL704.4	Apply and evaluate your knowledge for the Contribute to Open Source in different Technologies.
ITL704.5	Apply and evaluate your knowledge for the Contribute to Open Source in different Network Management..
ITL704.6	Apply and evaluate your knowledge for the Contribute to Open Source in different Applications and Services.

Course Name: Blockchain and DLT

Course Code: ITC801

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

Course Name: Blockchain Lab

Course Code: ITL801

ITL801.1	Develop and test smart contract on local Blockchain
ITL801.2	Develop and test smart contract on Ethereum test networks
ITL801.3	Write and deploy smart contract using Remix IDE and Metamask.
ITL801.4	Design and develop Cryptocurrency
ITL801.5	Write and deploy chain code in Hyperledger Fabric.
ITL801.6	Develop and test a Full-fledged DApp using Ethereum/Hyperledger

Course Name: Cloud Computing

Course Code: ITL802

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

Course Name: Big Data Analytics

Course Code: ITDO8011

ITDO8011.1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
ITDO8011.2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store, retrieve and process Big Data for Analytics.
ITDO8011.3	Implement several Data Intensive tasks using the Map Reduce Paradigm.
ITDO8011.4	Apply several newer algorithms for Clustering Classifying and finding associations in Big Data
ITDO8011.5	Design algorithms to analyze Big data like streams, Web Graphs and Social Media data

ITDO8011.6 Design and implement successful Recommendation engines for enterprises

Course Name: ERP

Course Code: ITDO8023

ITDO8023.1	Understand the basic concepts of ERP.
ITDO8023.2	Identify different technologies used in ERP
ITDO8023.3	Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules
ITDO8023.4	Discuss the benefits of ERP
ITDO8023.5	Understand and implement the ERP life cycle
ITDO8023.6	Apply different tools used in ERP

Course Name: Cloud Computing and Services

Course Code: ITDO8024

ITDO8024.1	Explain the basics concepts of cloud computing like service models, deployment models and its architecture.
ITDO8024.2	Describe and apply virtualization in cloud computing.
ITDO8024.3	Use and Analyze different cloud computing services
ITDO8024.4	Understand and apply various services provided by Amazon Web Services cloud platform
ITDO8024.5	Discuss the functionality of Openstack cloud platform & Serverless computing
ITDO8024.6	Recognize and examine the security and privacy concerns in cloud computing

Course Name: Project Management

Course Code: LO8011

LO8011.1	Apply selection criteria and select an appropriate project from different options.
LO8011.2	Write work break down structure for a project and develop a schedule based on it.
LO8011.3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
LO8011.4	Use Earned value technique and determine & predict status of the project.
LO8011.5	Capture lessons learned during project phases and document them for future reference

Course Name: Finance Management

Course Code: ILO8012

ILO8012.1	Understand Indian finance system and corporate finance
ILO8012.2	Take investment, finance as well as dividend decisions

Course Name: Research Methodology

Course Code: ILO8016

ILO8016.1	Prepare a preliminary research design for projects in their subject matter areas
ILO8016.2	Accurately collect, analyze and report data
ILO8016.3	Present complex data or situations clearly
ILO8016.4	Review and analyze research findings