

Vidyavardhini's college of Engineering & Technology Vasai(w)  
 Department of Information Technology  
 R - 2019 C Scheme

<b>Program Outcomes</b>
<b>PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</b>
<b>PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.</b>
<b>PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</b>
<b>PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.</b>
<b>PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.</b>
<b>PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.</b>
<b>PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.</b>
<b>PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</b>
<b>PO9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.</b>
<b>PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.</b>
<b>PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.</b>
<b>PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</b>
<b>Program Specific Outcomes</b>

<b>At the end of the program engineering graduate will be able to:</b>	
<b>PSO1: Apply and implement IT solutions in allied fields of engineering to solve real world problems.</b>	
<b>PSO2: Identify social and industrial problems, provide creative solutions and become quality asset for society and industry.</b>	
<b>PSO3: Deploy secured solution using Information Technology practices and strategies.</b>	
<b>Course Outcomes</b>	
	<b>At the end of the semester student will be able to</b>
<b>FEC101</b>	<b>Engineering Mathematics-I</b>
FEC101.1	Apply the concepts of Complex Numbers to solve Engineering problems.
FEC101.2	Apply hyperbolic functions and logarithm of complex number to solve Engineering problems.
FEC101.3	Compute the partial differentiation of functions of two & three variables.
FEC101.4	Find the nth order derivative of a function using successive differentiation & Compute maxima-minima of a function.
FEC101.5	Apply the properties of matrices to find rank of a matrix & to solve system of linear simultaneous equations.
FEC101.6	Solve the system of linear algebraic and transcendental equation numerically and also by using Scilab.
<b>FEC102</b>	<b>Engineering Physics-I</b>
FEC102.1	Analyze the motion of free particle using time independent & time dependent Schrodinger wave equation.
FEC102.2	Draw miller indices using concept of crystallography and Identify crystal structure using X-ray diffraction technique.
FEC102.3	Explore the concepts of semiconductor physics and apply them for applications like LED, photoconductor and photovoltaic cell.
FEC102.4	Employ the concept of interference in thin films in measurements.
FEC102.5	Examine the properties of superconductors and super capacitors and apply them for the applications in-hand.
FEC102.6	Explore the properties of engineering materials and their applications.
<b>FEC103</b>	<b>Engineering Chemistry-I</b>
FEC103.1	Analyze the quality of water and suggest methods of its treatment.
FEC103.2	Differentiate thermosoftening & thermosetting plastic & select appropriate fabrication method.

FEC103.3	Understand the concept of microscopic chemistry in terms of atomic and molecular orbital theory & calculate bond order of molecule.
FEC103.4	Understand the concept of aromaticity & calculate aromaticity using Huckel's Rule.
FEC103.5	Understand Gibb's phase rule & calculate number of phases, component & degree of freedom of one & two component system.
FEC103.6	Differentiate ionic, dipolar & Vander waal's intermolecular forces of attraction.
<b>FEC104</b>	<b>Engineering Mechanics</b>
FEC104.1	Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
FEC104.2	Demonstrate the understanding of Centroid and its significance and locate the same.
FEC104.3	Estimate required force to overcome friction and correlate real life application to specific type of friction.
FEC104.4	Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the .
FEC104.5	Illustrate different types of motions and establish Kinematic relations for a rigid body.
FEC104.6	Analyze particles in motion using force and acceleration, work-energy and impulse momentum.
<b>FEC105</b>	<b>Basic Electrical Engineering</b>
FEC105.1	Analyze DC circuits and apply Superposition, Thevenin's, Nortons', Maximum Power Transfer theorems to determine their response.
FEC105.2	Analyze single phase AC circuit and determine their response.
FEC105.3	Analyze three phase circuits and determine voltage/current/power relationship in star and delta connections.
FEC105.4	Understand the construction and operation of single phase transformer and evaluate its equivalent circuit and efficiency.
FEC105.5	Compare single phase & three phase machines on the basis of working principle, constructional details and operation.
<b>FEL101</b>	<b>Engineering Physics-I Lab</b>
FEL101.1	Perform the experiments based on interference in thin films and analyze the results.
FEL101.2	Determine the crystal structure and study/draw miller indices.
FEL101.3	Determine energy band gap of semiconductor.
FEL101.4	Study Hall Effect in semiconductor devices.
FEL101.5	Design a solution for a real world problem using knowledge gained in this course.
<b>FEL102</b>	<b>Engineering Chemistry-I Lab</b>

FEL102.1	Analyze water for its hardness.
FEL102.2	Estimate viscosity of lubricant using Redwood viscometer.
FEL102.3	Estimate chloride content of water using Mohr's method.
FEL102.4	Identify nature of solution based on its pH value.
FEL102.5	Demonstrate phenol-formaldehyde synthesis.
<b>FEL103</b>	<b>Engineering Mechanics Lab</b>
FEL103.1	Verify the law of polygon, varignon's theorem and find the resultant of given force
FEL103.2	Verify the conditions of equilibrium and find the beam reactions.
FEL103.3	Analyse the friction between two different surfaces.
FEL103.4	Demonstrate the understanding of Centroid and its significance and locate the same.
FEL103.5	Illustrate different types of motions and establish Kinematic relations for particles and rigid body.
FEL103.6	Verify the law of conservation of momentum and find the coefficient of restitution.
<b>FEL104</b>	<b>Basic Electrical Engineering Lab</b>
FEL104.1	Implement DC circuits and analyze their behavior using network theorems.
FEL104.2	Analyze frequency behavior of RLC circuit and calculate resonance frequency, Bandwidth and Q- factor.
FEL104.3	Determine relationship between voltage/current/power in three phase star/delta circuits.
FEL104.4	Perform OC/SC test on transformer and determine its equivalent circuit and efficiency.
FEL104.5	Illustrate the working of Single & Three Phase Induction Motor.
<b>FEL105</b>	<b>Basic Workshop practice-I</b>
FEL105.1	Use different fitting tools and perform the basic operations such as square, hexagonal and V male female joint.
FEL105.2	Develop the skill required for hardware maintenance, installation of operating system and system drivers.
FEL105.3	Identify the network components and perform basic networking and crimping.
FEL105.4	Develop the skill to use different plumbing tools and accesseroies for domestic water
<b>FEC201</b>	<b>Engineering Mathematics-II</b>
FEC201.1	Solve differential equations of first order & first degree.
FEC201.2	Solve linear differential equations with constant coefficients, variable coefficients of higher order.
FEC201.3	Apply Beta, Gamma functions and D.U.I.S.to solve improper integrals.
FEC201.4	Apply concepts of Double integral of different coordinate systems to compute Area.

FEC201.5	Apply concepts of triple integral of different coordinate systems to find volume of a
FEC201.6	Solve Differential equations & Definite integrals using Numerically and also by using
<b>FEC202</b>	<b>Engineering Physics-II</b>
FEC202.1	Examine the diffraction through single slit and its applications.
FEC202.2	Apply the foundation of laser and fiber optics in development of modern communication technology.
FEC202.3	Explore the fundamentals of Electrodynamics and its application in the field of engineering.
FEC202.4	Explore the fundamentals of special theory of relativity.
FEC202.5	Assimilate the scope of nanotechnology in modern developments and its role in emerging innovating applications.
FEC202.6	Select appropriate sensing technology for physical measurements in modern instrumentations.
<b>FEC204</b>	<b>Engineering Graphics</b>
FEC204.1	Apply the basic principles of projections in Projection of Lines and Planes.
FEC204.2	Apply the basic principles of projections in Projection of Solids & Section of solids.
FEC204.3	Apply the basic principles of projections in converting 3D view to 2D drawing.
FEC204.4	Visualize an object from the given two views.
<b>FEC205</b>	<b>C programming</b>
FEC205.1	Write an algorithm to support Structure Programming approach.
FEC205.2	Use variables, derived data types and control structures to write c program.
FEC205.3	Decompose a problem into functions and synthesize a complete program.
FEC205.4	Use Array and String for solving complex computational problem.
FEC205.5	Use Structure-Union for solving complex computational problem.
FEC205.6	Use Pointers for solving complex computational problem.
<b>FEC206</b>	<b>Professional Communication and Ethics-I</b>
FEC206.1	Communicate effectively using verbal/non-verbal cues at social and workplace
FEC206.2	Select/Use appropriate grammar and vocabulary in oral, written communication.
FEC206.3	Summarize/Comprehend passages, run plagiarism check softwares and generate plagiarism report for paraphrased passages.
FEC206.4	Write/ Draft academic, business and technical letter/email.
FEC206.5	Frame Definition, write user instruction, description of technical object, description of a Technical / Scientific Process.

FEC206.6	Demonstrate principles of ethics in professional environment.
<b>FEL201</b>	<b>Engineering Physics-II</b>
FEL201.1	Perform the experiments based on diffraction through slits using Laser source and analyze the results.
FEL201.2	Determine the number of lines on the grating surface using LASER Source.
FEL201.3	Perform the experiments using optical fibre and analyse its characteristics.
FEL201.4	Perform the experiments on various sensors and analyze the result.
FEL201.5	Implement a solution for a real world problem using knowledge gained in this course.
<b>FEL202</b>	<b>Engineering Chemistry-II</b>
FEL202.1	Analyse fuel for moisture content.
FEL202.2	Estimate Na,k & Ca in the given sample using flame photometer.
FEL202.3	Estimate flash point of diesel oil using Abel's apparatus.
FEL202.4	Determine saponification value of vegetable oil.
FEL202.5	Estimate acid value of vegetable oil.
<b>FEL203</b>	<b>Engineering Graphics</b>
FEL203.1	Apply the basic principles of projections in Projection of Lines and Planes and Curves.
FEL203.2	Apply the basic principles of projections in Projection of Solids & Section of solids.
FEL203.3	Apply basic AutoCAD skills to draw different views of a 3D object.
FEL203.4	Apply basic AutoCAD skills to draw the isometric view from the given two views.
<b>FEL204</b>	<b>C programming</b>
FEL204.1	Translate given algorithms to a program.
FEL204.2	Use variables, derived data types and control structures to write c program.
FEL204.3	Write iterative as well as recursive programs.
FEL204.4	Represent data in Array and String and manipulate them through a program.
FEL204.5	Use Structure-Union for solving complex computational problem.
FEL204.6	Declare pointers and demonstrate call by reference concept.
<b>FEL205</b>	<b>Professional Communication and Ethics-I</b>
FEL205.1	Listen and comprehend all types of spoken discourse successfully.
FEL205.2	Speak fluently and make effective professional presentations.
FEL205.3	Read large quantities of text in a short time to comprehend, summarise and evaluate content.

FEL205.4	Draft precise business letters, academic essays and technical guidelines.
FEL205.5	Dress finely and conduct themselves with confidence in social, academic and professional situation.
FEL205.6	Respond to moral dilemmas successfully.
<b>FEL206</b>	<b>Basic Workshop Practice - II</b>
FEL206.1	Use different carpentry tools and perform the basic operations like joints and wood turning practise.
FEL206.2	Understand the safe practices to adopt in electrical workshop.
FEL206.3	Demonstrate the wiring practices for the connection of simple electrical load.
FEL206.4	Demonstrate the use of furnace and produce the simple forging job.
<b>ITC301</b>	<b>Engineering Mathematics-III</b>
ITC301.1	Apply the concept of Laplace transform to solve the real integrals in engineering
ITC301.2	Apply the concept of inverse Laplace transform of various functions in engineering problems.
ITC301.3	Expand the periodic functions 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.
<b>ITC302</b>	<b>Data Structures &amp; Analysis</b>
ITC302.1	Apply the concepts of stacks, queues and linked list in real life problem solving.
ITC302.2	Apply and analyze the concepts trees in real life problem solving.
ITC302.3	Illustrate and justify the concepts of graphs in real life problem solving.
ITC302.4	Examine the concepts of sorting, searching techniques in real life problem solving.
ITC302.5	Use the concepts of recursion, hashing in real life problem solving.
ITC302.6	Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.
<b>ITC303</b>	<b>Database Management System</b>
ITC303.1	Identify the need of Database Management System and understand database
ITC303.2	Design ER/EER model for real life applications.

ITC303.3	Construct Relational Model from ER/EER Diagram.
ITC303.4	Write a query using SQL commands by Analyzing user requirement.
ITC303.5	Apply the concept of normalization to relational database design.
ITC303.6	Demonstrate the concept of transaction, concurrency and recovery.
<b>ITC304</b>	<b>Principles of Communication</b>
ITC304.1	Describe analog and digital communication systems.
ITC304.2	Differentiate types of noise and understand time/frequency domain representation using Fourier transform.
ITC304.3	Illustrate 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	Understand electromagnetic radiation and propagation of waves.
<b>ITC305</b>	<b>Paradigms and Computer Programming Fundamentals</b>
ITC305.1	To compare different programming paradigms and core language design issues and choose appropriate paradigm for problem at hand.
ITC305.2	To apply OO Paradigm for a given problem.
ITC305.3	To construct solution based on functional programming using Haskell.
ITC305.4	To demonstrate solution using logic programming.
ITC305.5	To use concurrency in programming.
ITC305.6	To illustrate use of scripting languages for different applications.
<b>ITL301</b>	<b>Data Structures Lab</b>
ITL301.1	Use the basic concepts and principles of stacks, queues and linked lists.
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	Apply the techniques of searching and sorting.
ITL301.6	Illustrate and examine the methods of linked lists, stacks, queues, trees and graphs to various real time problems.
<b>ITL302</b>	<b>SQL Lab</b>
ITL302.1	Construct the conceptual model for the defined 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	Establish database connectivity using JDBC.
ITL302.6	Implement the concept of concurrent transactions.
<b>ITL303</b>	<b>Computer programming Paradigms Lab</b>
ITL303.1	Apply Object Oriented concepts in C++ and develop applications.
ITL303.2	Construct solution based on functional programming using Haskell.
ITL303.3	Construct solution based on logic programming using Prolog.
ITL303.4	Develop multithreaded programs in Java and C++.
ITL303.5	Implement exception handling or garbage collection in C++ or JAVA.
ITL303.6	To construct a solution to the same problem using multiple paradigms.
<b>ITL304</b>	<b>Java Lab (SBL)</b>
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 a 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 along with response to the events.
ITL304.6	Develop Graphical User Interface by exploring Swing and JavaFX framework based on MVC architecture.
<b>ITM301</b>	<b>Mini Project – 1 A for Front end /backend Application using JAVA</b>
ITM301.1	Explore beyond the curriculum to identify problem of society, industrial or research
ITM301.2	Investigate the problem thoroughly and propose appropriate solution to solve the
ITM301.3	Design and implement project using appropriate method.
ITM301.4	Develop interpersonal skills to work as member of a group or leader.
ITM301.5	Write and present their work effectively with ethical values.
ITM301.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITC401</b>	<b>Engineering Mathematics-IV</b>
ITC401.1	Apply matrix theory to find eigen values and eigen vectors and their applications.
ITC401.2	Evaluate contour Integrals and expand the analytic functions inside circle.

ITC401.3	Apply Z-transforms and its inverse to solve engineering problems.
ITC401.4	Apply the concept of probability distribution to engineering problems and testing hypothesis of small samples using sampling theory.
ITC401.5	Apply the concept of Linear Programming to solve the optimization problems.
ITC401.6	Apply the Non-linear Programming techniques to solve the optimization problems.
<b>ITC402</b>	<b>Computer Network and Network Design</b>
ITC402.1	Explain the functionalities of different layers of the OSI & TCP/IP models and compare the models.
ITC402.2	Categorize the types of transmission media and explain data link layer.
ITC402.3	Analyze the network and select appropriate routing strategy.
ITC402.4	Describe the data transportation and session management issues and related.
ITC402.5	Implement compression strategies for the application in hand and establish client server model.
ITC402.6	Design a network by selecting appropriate IP addressing, Routing strategy, and application services.
<b>ITC403</b>	<b>Operating System</b>
ITC403.1	Describe functions and services of Operating System.
ITC403.2	Analyze performance of process scheduling algorithms.
ITC403.3	Apply process synchronization primitives and deadlock management.
ITC403.4	Analyze the memory allocation techniques and management functions of Operating
ITC403.5	Illustrate the services provided by Operating System for storage management.
ITC403.6	Explain the functions of various special-purpose Operating Systems.
<b>ITC404</b>	<b>Automata Theory</b>
ITC404.1	Design Regular languages, Expression and Grammars for automation of problem in
ITC404.2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
ITC404.3	Design Context Free languages and Grammars.
ITC404.4	Design different types of Push down Automata as Simple Parser.
ITC404.5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
ITC404.6	Develop understanding of applications of various Automata.
<b>ITC405</b>	<b>Computer Organization and Architecture</b>

ITC405.1	Apply concepts of number system, combinational circuits and sequential circuits for application in hand.
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	Represent data in appropriate format and perform arithmetic operations.
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.
<b>ITL401</b>	<b>Network Lab</b>
ITL401.1	Executes basic networking commands and configure NS2.
ITL401.2	Simulate different topologies with different protocols.
ITL401.3	Implement socket programming using TCP and UDP for client server architecture.
ITL401.4	Analyze the traffic flow in the network using modern network analyzer tools.
ITL401.5	Design a network for an organization using concepts of addressing naming and routing.
<b>ITL402</b>	<b>Unix Lab</b>
ITL402.1	Understand the architecture of Unix OS, install Linux and execute general purpose commands.
ITL402.2	Execute file system management and user management commands and explore their options.
ITL402.3	Execute process management and memory management commands explore their
ITL402.4	Write shell scripts for basic applications.
ITL402.5	Write scripts to perform basic tasks using grep, sed commands and awk & Perl
<b>ITL403</b>	<b>Microprocessor Lab</b>
ITL403.1	Demonstrate various components and peripheral of computer system.
ITL403.2	Analyze and design combinational circuits.
ITL403.3	Write a program on a microprocessor using arithmetic & logical instruction set of
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	Illustrate interfacing of peripheral devices with 8086 microprocessor.
<b>ITL404</b>	<b>Python Lab (SBL)</b>
ITL404.1	Implement various data structures like lists, sets, dictionary, tuples to represent real world data in python program.

ITL404.2	To identify class requirement and construct python objects for real world entities.
ITL404.3	To access database to perform CRUD operations.
ITL404.4	To handle and manipulate large data using Numpy and Pandas.
ITL404.5	To visualize data using matplotlib.
ITL404.6	To design solution to real world problem using python
<b>ITM401</b>	<b>Mini Project – 1 B for Python based automation projects</b>
ITM401.1	Explore beyond the curriculum to identify problem of society, industrial or research
ITM401.2	Investigate the problem thoroughly and propose appropriate solution to solve the
ITM401.3	Design and implement project using appropriate method.
ITM401.4	Develop interpersonal skills to work as member of a group or leader.
ITM401.5	Write and present their work effectively with ethical values.
ITM401.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITC 501</b>	<b>Internet Programming</b>
ITC 501.1	Select protocols or technologies required for various web applications.
ITC 501.2	Apply JavaScript to add functionality to web pages.
ITC 501.3	Design front end application using basic React.
ITC 501.4	Design front end applications using functional components of React.
ITC 501.5	Design back-end applications using Node.js.
ITC 501.6	Construct web based Node.js applications using Express.
<b>ITC 502</b>	<b>Computer Network Security</b>
ITC 502.1	Develop understanding of computer security and network security and employ encryption techniques.
ITC 502.2	Apply basic cryptographic techniques using classical and block encryption methods.
ITC 502.3	Illustrate the system security malicious software.
ITC 502.4	Choose security protocols applicable as different layer for secured data communication.
ITC 502.5	Demonstrate network management security and illustrate the need for NAC.
ITC 502.6	Describe the function of an IDS and firewall for the system security.
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<b>ITC 503</b>	<b>Entrepreneurship and E- business</b>
ITC 503.1	Relate the concept of entrepreneurship and its close relationship with enterprise and owner-management.
ITC 503.2	Discover the nature of business development in the context of existing organizations and of new business start-ups.
ITC 503.3	Comprehended important factors for starting a new venture and business development.
ITC 503.4	Identify issues and decisions involved in financing and resourcing a business start-up.
ITC 503.5	Distinguish various E-business Models.

ITC 503.6	Compare various E-business Strategies.
<b>ITC 504</b>	<b>Software Engineering</b>
ITC 504.1	Apply basic knowledge in software engineering.
ITC 504.2	Identify requirements, analyze and prepare models.
ITC 504.3	Plan, schedule and track the progress of the projects.
ITC 504.4	Design & develop the software solutions for the growth of society.
ITC 504.5	To demonstrate and evaluate real time projects with respect to software engineering principles.
ITC 504.6	Apply testing and assure quality in software solution.
<b>ITDO5012</b>	<b>Advance Data Management Technologies</b>
ITDO5012.1	Measure query costs and design alternate efficient paths for query
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.
<b>ITDO5014</b>	<b>Advanced Data structure and Analysis</b>
ITDO5014.1	Demonstrate fundamentals of analysis of algorithms and to calculate complexity.
ITDO5014.2	Perform operations on advanced data structure.
ITDO5014.3	Apply divide and conquer approach and greedy programming technique to solve the problems.
ITDO5014.4	Apply the dynamic programming technique to solve the problems.
ITDO5014.5	Apply pattern matching algorithm for a given application.
ITDO5014.6	Illustrate concepts of Optimization, Approximation and Parallel computing algorithms.
<b>ITL501</b>	<b>IP Lab</b>
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.
<b>ITL502</b>	<b>Security Lab</b>
ITL502.1	Illustrate symmetric cryptography by implementing classical ciphers.
ITL502.2	Implement key management, distribution and user authentication.
ITL502.3	Employ different network reconnaissance tools to gather information about networks to identify vulnerabilities in network.

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	Implement the network security system using open source tools.
<b>ITL503</b>	<b>DevOPs Lab</b>
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.
<b>ITL504</b>	<b>Advance DevOPs Lab</b>
ITL504.1	To deploy compute and storage solutions on AWS.
ITL504.2	To deploy applications using kubernetes.
ITL504.3	To create infrastructure using code.
ITL504.4	To apply code pipeline for application development.
ITL504.5	To securely deploy apps.
ITL504.6	To develop serverless applications using Lambda.
<b>ITL505</b>	<b>Professional Communication &amp; Ethics-II (PCE-II)</b>
ITL505.1	Write effective business/ technical documents.
ITL505.2	Relate and apply strategies for personal and professional skills to meet the demands of the industry.
ITL505.3	Apply various techniques to be successful in group discussions, technical presentation and meetings.
ITL505.4	Deliver successful professional presentations.
ITL505.5	Develop creative thinking and interpersonal skills.
ITL505.6	Apply codes of ethical conduct & organizational behaviour.
<b>ITM506</b>	<b>Mini Project – 2 A Web Based Business Model</b>
ITM506.1	Explore beyond the curriculum to identify problem of society, industrial or research
ITM506.2	Investigate the problem thoroughly and propose appropriate solution to solve the
ITM506.3	Design and implement project using appropriate method.
ITM506.4	Develop interpersonal skills to work as member of a group or leader.

ITM506.5	Write and present their work effectively with ethical values.
ITM506.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITC601</b>	<b>Data Mining &amp; Business Intelligence</b>
ITC601.1	Demonstrate the concepts of data warehouse and design star schema, snowflake schema for a given problem.
ITC601.2	Apply the techniques of data exploration and preprocessing techniques to prepare the data for application of data mining algorithms.
ITC601.3	Implement the data mining algorithm of classification on large data sets and apply metrics to measure the performance of various data mining algorithms.
ITC601.4	Implement the data mining algorithm of clustering on large data sets and apply metrics to measure the performance of various data mining algorithms.
ITC601.5	Implement the data mining algorithm of frequent pattern mining on large data sets and apply metrics to measure the performance of various data mining algorithms.
ITC601.6	Apply BI to make strategic decisions.
<b>ITC602</b>	<b>Web X.0</b>
ITC602.1	To analyze website usage.
ITC602.2	Apply TypeScript to add functionality to web pages.
ITC602.3	Design front end application using basic Angular.
ITC602.4	Design database solutions using MongoDB.
ITC602.5	Design back-end applications using Flask.
ITC602.6	Construct RIA using Ajax.
<b>ITC603</b>	<b>Wireless Technology</b>
ITC603.1	Summarize the basic concepts of Wireless Network and Wireless Generations.
ITC603.2	Evaluate the various Wide Area Wireless Technologies.
ITC603.3	Analyze IEEE standards used for implementation of WLAN and WMAN
ITC603.4	Appraise the importance of WPAN, WSN and Ad-hoc Networks.
ITC603.5	Categorize various Wireless Network Security Standards.
ITC603.6	Recognize the design considerations for deploying the Wireless Network Infrastructure.
<b>ITC604</b>	<b>Artificial Intelligence and Data Science-1</b>
ITC604.1	Identify 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	Formalize the problem as a state space/graph as well as evaluate and select the appropriate search method.
ITC604.4	Solve real world problems with data science and tackle them from a statistical

ITC604.5	Select and apply appropriately from a wider range of exploratory and inferential methods for analysing data and evaluate and interpret the results contextually.
ITC604.6	Apply different machine learning methods for real world problems.
<b>ITDO6012</b>	<b>Image Processing</b>
ITDO6012.1	Understand basics of monochrome images and apply them for image processing applications.
ITDO6012.2	Select among various spatial domain filtering techniques and apply them for image enhancement.
ITDO6012.3	Transform the image and use it for representation, enhancement and/or compression.
ITDO6012.4	Exploit redundancy in the images and use it for image compression.
ITDO6012.5	Find the region of interest using various techniques and represent it for image processing applications.
ITDO6012.6	Choose structuring element and apply morphological operations to extract required information from image.
<b>ITDO6014</b>	<b>Ethical Hacking and Forensic</b>
ITDO6014.1	Illustrate the concept of ethical hacking.
ITDO6014.2	Recognize the need of digital forensics and examine the concept of digital evidence and incident response.
ITDO6014.3	Relate the knowledge of computer forensics using different tools and techniques.
ITDO6014.4	Detect the network attacks and analyze the evidence.
ITDO6014.5	Relate the knowledge of mobile forensics using different tools and techniques.
ITDO6014.6	Illustrate the method to generate legal evidence and supporting investigation reports.
<b>ITL601</b>	<b>BI Lab</b>
ITL601.1	Design Star Schema and Snowflake Schema for the given problem.
ITL601.2	Perform data pre-processing and data exploration on the given data set.
ITL601.3	Implement and evaluate classification algorithms on the given data set.
ITL601.4	Implement and evaluate clustering algorithms on the given data set.
ITL601.5	Implement and evaluate frequent pattern mining algorithms on the given data set.
ITL601.6	Acquire hands-on experience in using conventional data mining software, build a BI application and evaluate its strength and limitations.
<b>ITL602</b>	<b>Web Lab</b>
ITL602.1	To apply analysis tools on websites.
ITL602.2	Apply TypeScript to add functionality to web pages.
ITL602.3	Design front end application using basic Angular.



ITL602.4	Design database solutions using MongoDB.
ITL602.5	Design back-end applications using Flask.
ITL602.6	Construct RIA using Ajax.
<b>ITL603</b>	<b>Sensor Lab</b>
ITL603.1	Summarize 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	Prepare a report and present the findings of the study conducted in the preferred
ITL603.6	Demonstrate the ability to work in teams and manage the conduct of the research study.
<b>ITL604</b>	<b>MAD &amp; PWA Lab</b>
ITL604.1	Describe functions and services of Operating System.
ITL604.2	Analyze performance of process scheduling algorithms.
ITL604.3	Apply process synchronization primitives and deadlock management.
ITL604.4	Analyze the memory allocation techniques and management functions of Operating
ITL604.5	Illustrate the services provided by Operating System for storage management.
ITL604.6	Explain the functions of various special-purpose Operating Systems.
<b>ITL605</b>	<b>DS using Python Lab (SBL)</b>
ITL605.1	Apply pre-processing techniques to prepare data for data science applications.
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	Build an application that performs exploratory data analysis using Apache Spark.
ITL605.6	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.
<b>ITM601</b>	<b>Mini Project – 2 B Based on ML</b>
ITM601.1	Explore beyond the curriculum to identify problem of society, industrial or research

ITM601.2	Investigate the problem thoroughly and propose appropriate solution to solve the
ITM601.3	Design and implement project using appropriate method.
ITM601.4	Develop interpersonal skills to work as member of a group or leader.
ITM601.5	Write and present their work effectively with ethical values.
ITM601.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITC701</b>	<b>AI and DS –II</b>
ITC701.1	Apply reasoning to handle uncertainty in AI models.
ITC701.2	Analyse the process of building a Cognitive application.
ITC701.3	Design fuzzy controller system using fuzzy membership functions.
ITC701.4	Study deep learning models and evaluate response of the network.
ITC701.5	Evaluate performance of advanced ML classification algorithms.
ITC701.6	Analyze current trends in Data Science.
<b>ITC702</b>	<b>Internet of Everything</b>
ITC702.1	Describe the Characteristics and Conceptual Framework of IoT.
ITC702.2	Differentiate between the levels of the IoT architectures.
ITC702.3	Analyse the communication requirements of the system and select an appropriate IoT access technology.
ITC702.4	Illustrate various edge to cloud protocol for IoT.
ITC702.5	Apply appropriate analytics and data visualization technique of IoT data.
ITC702.6	Formulate a solution to solve a real-world problem using IoT concepts.
<b>ITDO7013</b>	<b>Infrastructure Security</b>
ITDO7013.1	Identify vulnerabilities, attacks and understand protection mechanisms
ITDO7013.2	Interpret software vulnerabilities and attacks on databases and operating systems.
ITDO7013.3	Explain the need for security protocols in the context of wireless communication.
ITDO7013.4	Discuss various security solutions for cloud infrastructure.
ITDO7013.5	Describe different attacks on Open Web Applications and Webservices.
ITDO7013.6	Implement appropriate security policies to protect infrastructure components.
<b>ITDO7014</b>	<b>Software Testing and QA</b>
ITDO7014.1	Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs for quality improvement.
ITDO7014.2	Analyze and apply different software testing methodologies and techniques for general environments.
ITDO7014.3	Manage the testing process and testing metrics.
ITDO7014.4	Automate test processes to improve quality and get familiar with quality assurance models.
ITDO7014.5	Apply the software testing techniques in specialized environment.
ITDO7014.6	Use practical knowledge of a variety of ways to test software and quality attributes.
<b>ITDO7021</b>	<b>MANET</b>

ITDO7021.1	Understand the fundamentals of Mobile ad-hoc Networks
ITDO7021.2	Understand and be able to use advanced concept of MAC layer protocols more effective
ITDO7021.3	Analyse different routing technologies for designing a routing protocol
ITDO7021.4	Understand the concepts of Transport layer and security features of Ad-hoc network.
ITDO7021.5	Create the awareness of QoS and Energy Management in Ad hoc network.
ITDO7021.6	Demonstrate the ability of wireless sensor network.
<b>ITIO7013</b>	<b>Management Information System</b>
ITIO7013.1	Identify the impact of information systems on an organization.
ITIO7013.2	Use tools and technologies to access database information for improving business performance and decision making.
ITIO7013.3	Identify the threats to information systems and apply security controls for IS.
ITIO7013.4	Identify use of social computing for business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce.
ITIO7013.5	Use technologies that underlie pervasive computing, providing examples of how businesses can utilize each one.
ITIO7013.6	Identify the Transaction Processing, Functional Area Information and ERP system for enterprise-wide knowledge management.
<b>ITL701</b>	<b>Data Science Lab</b>
ITL701.1	Implement reasoning to handle uncertainty.
ITL701.2	Build a cognitive application by exploring various use cases of Cognitive Computing.
ITL701.3	Design a fuzzy controller system using fuzzy tool.
ITL701.4	Develop real life applications using deep learning concepts.
ITL701.5	Evaluate performance of applications built using classification algorithms.
ITL701.6	Build an application based on current trends in Data Science.
<b>ITL702</b>	<b>IOE Lab</b>
ITL702.1	Explore beyond the curriculum to identify the real world problem which can be solved using concepts of IoT.
ITL702.2	Investigate the problem through in-depth literature survey and propose appropriate solution to solve the problem.
ITL702.3	Choose appropriate modern tools and plan/implement the proposed solution with effective utilization of the resources.
ITL702.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
ITL702.5	Write and present the findings of the study effectively with ethical values.
ITL702.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITL703</b>	<b>Secure Application Development</b>
ITL703.1	Summarize laws, standards and guidelines of cyber security.
ITL703.2	Infer the OWASP methodologies and standards.
ITL703.3	Identify main vulnerabilities inherent in applications.
ITL703.4	Demonstrate Data Validation and Authentication for application.

ITL703.5	Demonstrate Security at Session Layer Management.
ITL703.6	Apply secure coding for cryptography.
<b>ITL704</b>	<b>Recent Open Source Project Lab</b>
ITL704.1	Understand and apply the basic concepts of Open Source Software.
ITL704.2	Identify the difference between the GPL (General Public License) 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.
<b>ITP701</b>	<b>Major Project I</b>
ITP701.1	Explore beyond the curriculum to identify problem of society, industrial or research needs.
ITP701.2	Investigate the problem through in-depth literature survey and propose appropriate solution to solve the problem.
ITP701.3	Choose appropriate modern tools and plan/implement the proposed solution with effective utilization of the resources available.
ITP701.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
ITP701.5	Write and present their work effectively with ethical values.
ITP701.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITC801</b>	<b>Blockchain and DLT</b>
ITC801.1	Analyze the security concept of Blockchain and Distributed Ledger Technology.
ITC801.2	Implement cryptocurrencies in bitcoin.
ITC801.3	Implement smart contracts in Ethereum.
ITC801.4	Install and configure hyperledger fabric.
ITC801.5	Utilize different cryptocurrencies.
ITC801.6	Apply blockchain concepts for various applications.
<b>ITL801</b>	<b>Blockchain Lab</b>
ITL801.1	To develop Local blockchain.
ITL801.2	To design and develop cryptocurrency.
ITL801.3	To publish smart contract.
ITL801.4	To implement permissioned blockchain.
ITL801.5	To apply blockchain for solving problem.
ITL801.6	To create token.

<b>ITL802</b>	<b>Cloud Computing</b>
ITL802.1	Create virtual machines using open source technology.
ITL802.2	Compare cloud computing services SaaS/PaaS/IaaS for a given application.
ITL802.3	Design and develop real world web applications and deploy them on commercial clouds
ITL802.4	Deploy cloud services to address security issues .
ITL802.5	Identify commercially available cloud services and recommend the appropriate one for the given application.
ITL802.6	Implement the concept of containerization.
<b>ITP801</b>	<b>Major Project-II</b>
ITP801.1	Explore beyond the curriculum to identify problem of society, industrial or research needs; investigate the problem through in-depth literature survey and propose appropriate solution to solve the problem.
ITP801.2	Implement the methodology with modern tools and provide sustainable solution with effective utilization of the resources available.
ITP801.3	Analyze and compare the results with the standard results.
ITP801.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
ITP801.5	Write and present their work effectively with ethical values.
ITP801.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
<b>ITDO8011</b>	<b>Big Data Analytics</b>
ITDO8011.1	Identify issues and challenges in Big data analytics.
ITDO8011.2	Identify Hadoop components and suitable NoSQL systems to handle big data.
ITDO8011.3	Apply MapReduce techniques to solve real world problems.
ITDO8011.4	Apply filtering techniques, counting distinct element and counting ones in window algorithms on data stream.
ITDO8011.5	Apply several newer algorithms for clustering, classifying and finding associations in Big Data.
ITDO8011.6	Analyze case study of Big data applications.
<b>ITDO8021</b>	<b>User Interface Design</b>
ITDO8021.1	Identify and criticize bad features of interface designs and to predict good features of interface designs.
ITDO8021.2	Predict good features of interface design.
ITDO8021.3	Illustrate and analyze user needs and formulate user design specifications.
ITDO8021.4	Interpret and evaluate the data collected during the process.
ITDO8021.5	Evaluate designs based on theoretical frameworks and methodological approaches.
ITDO8021.6	Apply better techniques to improve the user interaction design interfaces.
<b>ITDO8024</b>	<b>Cloud computing and Services</b>
ITDO8024.1	Analyze basics concepts of cloud computing service models, deployment models and its architecture.

ITDO8024.2	Compare virtualization & cloud computing and develop virtual machines
ITDO8024.3	Analyze different cloud computing services.
ITDO8024.4	Analyze various services provided by Amazon Web Services cloud platform.
ITDO8024.5	Analyze the functionality of Cloud using Openstack cloud platform & Serverless
ITDO8024.6	Analyze the security and privacy issues in cloud computing and how to use them.
<b>ITIO8011</b>	<b>Project Management</b>
ITIO8011.1	Identify appropriate projects from various options and need of project management.
ITIO8011.2	Apply selection criteria and select an appropriate project from different options.
ITIO8011.3	Develop Work Breakdown Structure to prepare the schedule for the project.
ITIO8011.4	Identify and predict the opportunities and threats and to decide various strategic approaches to deal with projects.
ITIO8011.5	Evaluate project performance using Earned value Technique.
ITIO8011.6	Prepare a final report considering analysis, Success and failures for the project.
<b>ITIO8015</b>	<b>Professional Ethics and Corporate Social Responsibility (CSR)</b>
ITIO8015.1	Understand rights and duties of business.
ITIO8015.2	Analyze and explore duties of business and professional ethics in the marketplace.
ITIO8015.3	Analyze and Demonstrate professional ethics of consumer protection and job discrimination
ITIO8015.4	Describe and analyze different aspects of corporate social responsibility
ITIO8015.5	Analyze interrelatedness of enterprises and corporate social responsibility.
ITIO8015.6	Understand legal aspects of corporate social responsibility.



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