SEMESTER 1 & SEMESTER 2 (2024 SCHEME)

Course	MATHEMATICS FOR INFORMATION SCIENCE – 1
Course Code	GAMAT101
Course Outcomes	
CO1	Apply various concepts in calculus to linearize functions and to analyze concavity.
CO2	Calculate the limits for functions of two variables and partial derivatives of multivariable functions.
CO3	Interpret directional derivative and solve maxima and minima of multivariable functions.
CO4	Solve constrained maxima and minima, LPP and understand the method of Steepest Descent.

Course	PHYSICS FOR INFORMATION SCIENCE
Course Code	GAPHT121
Course Outcomes	
CO1	Explain electrical conductivity and Superconductivity.
CO2	Explain the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics.
CO3	Apply the fundamentals of Semiconductor Physics in engineering.
CO4	Describe the behaviour of semiconductor materials in semiconductor devices.
CO5	Apply basic knowledge of principles and theories in physics to conduct experiments.

Course	CHEMISTRY FOR INFORMATION SCIENCE AND ELECTRICAL SCIENCE
Course Code	GXCYT122
Course Outcomes	
CO1	Explain the Basic Concepts of Electrochemistry and Corrosion to explore the possible applications in various engineering fields
CO2	Describe the use of various engineering materials in different industries
CO3	Apply appropriate analytical techniques for the synthesis and characterization of various engineering materials.
CO4	Outline various water treatment and waste management methods

Course	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAWING
Course Code	GMEST103
Course Outcomes	
CO1	Understand the projection of points and lines located in different quadrants
CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions
CO3	Plot sectional views and develop surfaces of a given object
CO4	Prepare pictorial drawings using the principles of isometric projection
CO5	Sketch simple drawing using CAD tools.

Course	INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING
Course Code	GXEST104
Course Outcomes	
CO1	Apply fundamental concepts and circuit laws to solve simple DC/AC electric circuits
CO2	Classify series and parallel magnetic circuits
CO3	Understand three phase AC systems
CO4	Explain the fundamental concepts of electronic components and devices
CO5	Outline the principles of communication systems
CO6	Identify various applications of modern electronics in the contemporary world

Course	ALGORITHMIC THINKING WITH PYTHON
Course Code	UCEST105
Course Outcomes	
CO1	Utilize computing as a model for solving real-world problems.
CO2	Articulate a problem before attempting to solve it and prepare a clear and accurate model to represent the problem.
CO3	Utilize effective algorithms to solve the formulated models and translate algorithms into executable programs.
CO4	Interpret the problem-solving strategies, a systematic approach to solving computational problems, and essential Python programming skills

Course	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
Course Code	GXESL106
Course Outcomes	
CO1	Demonstrate safety measures against electrical shocks
CO2	Familiarise with transformers, rheostats, batteries and earthing schemes
CO3	Illustrate the connection diagram and identify the suitable accessories necessary for wiring simple electric circuits
CO4	Identify various electronic components
CO5	Operate various measuring instruments
CO6	Apply the design procedure of simple electronic circuits on breadboard and PCB
CO7	Build the ability to work in a team with good interpersonal skills

Course	HEALTH AND WELLNESS
Course Code	UCHWT127
Course Outcomes	
CO1	Explain the different human body systems and describe various types of physical activities along with methods to measure and quantify these activities.
CO2	Explain how to maintain or improve health and wellness through psychological practices, dietary habits, and sports activities.
CO3	Discuss about common hypokinetic disorders and musculoskeletal disorders, and describe the importance of leading a healthy lifestyle through the practice of yoga and abstaining from addictive substances.
CO4	Explain the basics of first aid and describe common sports injuries

Course	LIFE SKILLS AND PROFESSIONAL COMMUNICATION
Course Code	UCHUT128
Course Outcomes	
CO1	Develop the ability to know & understand oneself, show confidence in one's potential & capabilities, set goals and develop plans to accomplish tasks
CO2	Develop the ability to communicate and connect with others, participate in groups/teams, empathise, respect diversity, be responsible and understand the need to exercise emotional intelligence
CO3	Develop thinking skills, problem-solving and decision-making skills
CO4	Develop listening, reading, writing & speaking skills, ability to comprehend & successfully convey any idea, and ability to analyze, interpret & effectively summarize textual, audio & visual content
CO5	Develop the ability to create effective presentations through audio-visual mediums with the use of technology tools and initiate effective use of social media platforms & tech forums for content delivery and discussions
CO6	Initiate profile-building exercises in line with the professional requirements, and start networking with professionals/academicians

Course	MATHEMATICS FOR INFORMATION SCIENCE – 2
Course Code	GAMAT201
Course Outcomes	
CO1	Solve systems of linear equations, to evaluate eigen values and eigen vectors of matrices and to diagonalize matrices.
CO2	Understand the concepts of vector spaces and subspaces and to apply their properties.
CO3	Describe inner product spaces and their properties, to apply orthonormalization processes and to solve least square problems.
CO4	Understand the concept of linear transformation and to apply its properties, to find the rank and nullity of a linear transformation and to find the matrices of linear transformations.

Course	FOUNDATIONS OF COMPUTING: FROM HARDWARE ESSENTIALS TO WEB DESIGN
Course Code	GXEST203
Course Outcomes	
CO1	Identify the fundamental components and the working of an IT environment.
CO2	Explain the data representations, CPU architectures, and the basic K2 K2 functioning of a computer.
CO3	Explain the operating systems, computer network architecture, and K2 necessary protocols used..
CO4	Develop simple interactive web pages and validate the inputs.

Course	PROGRAMMING IN C
Course Code	GXEST204
Course Outcomes	
CO1	Infer a computational problem and develop C programs from them using basic constructs of C language including the control statements.
CO2	Develop C programs using arrays, matrices, and strings.
CO3	Utilize functions to find solutions to the computational problems by dividing it into a number of modules and abstract data types.
CO4	Develop C programs using pointers for dynamic data handling.
CO5	Use files in C to permanently store and manipulate data.

Course	ENGINEERING ENTREPRENEURSHIP AND IPR
Course Code	UCEST206
Course Outcomes	
CO1	Gain foundational knowledge of Innovation and Entrepreneurship, Intellectual Property Rights (IPR) and their importance for startups.
CO2	Develop a framework for identifying, curating and validating engineering-based business ideas.
CO3	Learn essential tools for understanding product-market fit and customer needs.
CO4	Create a comprehensive business plan for a new venture.
CO5	Develop skills for prototyping, stakeholder engagement, and team collaboration.

Course	IT WORKSHOP
Course Code	GXESL208
Course Outcomes	
CO1	Experiment with the fundamental hardware components of a computer and how to interface them with software systems.
CO2	Make use of the command line of Linux operating system and shell programming.
CO3	Experiment with the data network communication scenarios using Wireshark.
CO4	Develop basic websites using HTML, CSS & JavaScript and manage the versions.

Course	DISCRETE MATHEMATICS
Course Code	PCCST205
Course Outcomes	
CO1	Check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic
CO2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion.
CO3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science.
CO4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science
CO5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients
CO6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups.

Course	DISCRETE MATHEMATICAL STRUCTURES
Course Code	PCITT205
Course Outcomes	
CO1	Apply logical reasoning and formal methods to construct and verify logical arguments and proofs involving propositions, truth tables, logical equivalence, and quantifiers.
CO2	Apply fundamental counting principles, including permutations, combinations, and the pigeonhole principle, to solve problems related to combinatorial analysis and discrete structures.
CO3	Describe the concepts of sets, relations, and functions, and recognize the properties and structures of algebraic systems such as lattices, semigroups, monoids, groups, rings, and fields.
CO4	Explain the concepts of sets, relations, functions, algebraic structures such as groups and fields, and the methods for solving first and second order linear recurrence relations using generating functions and other techniques.

SEMESTER 3 (2024 SCHEME)

Course	MATHEMATICS FOR COMPUTER AND INFORMATION SCIENCE - 3
Course Code	GAMAT301
Course Outcomes	
CO1	Understand the concept, properties and important models of discrete random variables and to apply in suitable random phenomena.
CO2	Understand the concept, properties and important models of continuous random variables and to apply in suitable random phenomena.
CO3	Familiarize and apply limit theorems and to understand the fundamental characteristics of stochastic processes.
CO4	Solve problems involving Markov Chains, to understand their theoretical foundations and to apply them to model and predict the behaviour of various stochastic processes.

Course	THEORY OF COMPUTATION
Course Code	PCCST302
Course Outcomes	
CO1	Classify formal languages into regular, context-free, context-sensitive, and unrestricted languages.
CO2	Develop finite state automata, regular grammar, and regular expression.
CO3	Model push-down automata and context-free grammar representations for context-free languages.
CO4	Construct Turing Machines to accept recursive and recursively enumerable languages.
CO5	Describe the notions of decidability and undecidability of problems, the Halting problem.

Course	DATA STRUCTURES AND ALGORITHMS
Course Code	PCCST303
Course Outcomes	
CO1	Identify appropriate data structures for solving real world problems.
CO2	Describe and implement linear data structures such as arrays, linked lists, stacks, and queues.
CO3	Describe and Implement non linear data structures such as trees and graphs.
CO4	Select appropriate searching and sorting algorithms to be used in specific circumstances.

Course	OBJECT ORIENTED PROGRAMMING
Course Code	PBCST304
Course Outcomes	
CO1	Explain the process of writing, compiling, and executing basic Java programs, including their structure and components, to demonstrate proficiency.
CO2	Utilize object-oriented programming principles in the design and implementation of Java applications.
CO3	Develop and manage Java packages and interfaces, enhancing code modularity and reusability.
CO4	Implement error handling using Java's exception mechanisms and leverage interfaces for modular applications
CO5	Develop event-driven Java GUI applications with database connectivity using Swing and JDBC.

Course	DIGITAL ELECTRONICS AND LOGIC DESIGN
Course Code	GAEST305
Course Outcomes	
CO1	Summarize the basic concept of different number systems and perform conversion and arithmetic operations between different bases.
CO2	Interpret a combinational logic circuit to determine its logic expression, truth table, and timing information and to synthesize a minimal logic circuit through algebraic manipulation or with a Karnaugh map.
CO3	Illustrate the fundamental role of hardware description languages in modern digital design and be able to develop the hardware models for different digital circuits.
CO4	Develop MSI logic circuits using both the classical digital design approach and the modern HDL-based approach.
CO5	Develop common circuits based on sequential storage devices including counter, shift registers and a finite state machine using the classical digital design approach and an HDL-based structural approach.

Course	ECONOMICS FOR ENGINEERS
Course Code	UCHUT346
Course Outcomes	
CO1	Understand the fundamentals of various economic issues using laws and learn the concepts of demand, supply, elasticity and production function.
CO2	Develop decision making capability by applying concepts relating to costs and revenue, and acquire knowledge regarding the functioning of firms in different market situations.
CO3	Outline the macroeconomic principles of monetary and fiscal systems, national income and stock market.
CO4	Make use of the possibilities of value analysis and engineering, and solve simple business problems using break even analysis, cost benefit analysis and capital budgeting techniques.

Course	ENGINEERING ETHICS AND SUSTAINABLE DEVELOPMENT
Course Code	UCHUT347
Course Outcomes	
CO1	Develop the ability to apply the principles of engineering ethics in their professional life.
CO2	Develop the ability to exercise gender-sensitive practices in their professional lives
CO3	Develop the ability to explore contemporary environmental issues and sustainable practices.
CO4	Develop the ability to analyse the role of engineers in promoting sustainability and climate resilience.
CO5	Develop interest and skills in addressing pertinent environmental and climate-related challenges through a sustainable engineering approach.

Course	DATA STRUCTURES LAB
Course Code	PCCSL307
Course Outcomes	
CO1	Model a real world problem using suitable data structure and implement the solution.
CO2	Compare efficiency of different data structures in terms of time and space complexity.
CO3	Evaluate the time complexities of various searching and sorting algorithms.
CO4	Differentiate static and dynamic data structures in terms of their advantages and application.

Course	DIGITAL LAB
Course Code	PCCSL308
Course Outcomes	
CO1	Model and construct combinational logic circuits.
CO2	Develop modular combinational circuits with MUX,DEMUX and decoder.
CO3	Experiment with synchronous and asynchronous sequential circuits.
CO4	Model and implement FSM.

SEMESTER 4 (2024 SCHEME)

Course	MATHEMATICS FOR COMPUTER AND INFORMATION SCIENCE-4
Course Code	GAMAT401
Course Outcomes	
CO1	Understand the fundamental concepts of graph theory such as types of graphs, degree of a vertex, graph isomorphism, connectedness.
CO2	Understand the concepts of Euler graphs, Hamiltonian graphs and connectivity.
CO3	Apply Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's and Floyd-Warshall algorithms for finding shortest paths.
CO4	Illustrate various representations of graphs using matrices and apply vertex coloring in real life problems.

Course	DATABASE MANAGEMENT SYSTEMS
Course Code	PCCST402
Course Outcomes	
CO1	Summarize and exemplify the fundamental nature and characteristics of database systems
CO2	Model and design solutions for efficiently representing data using the relational model or non-relational model.
CO3	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems
CO4	Construct advanced SQL queries to effectively retrieve, filter, and manipulate data from relational databases.
CO5	Experiment with NoSQL databases in real world applications

Course	OPERATING SYSTEMS
Course Code	PCCST403
Course Outcomes	
CO1	Apply the concepts of process management and process scheduling mechanisms employed in operating systems.
CO2	Choose various process synchronization mechanisms employed in operating systems.
CO3	Use deadlock prevention and avoidance mechanisms in operating systems.
CO4	Select various memory management techniques in operating systems.
CO5	Understand the storage management in operating systems.

Course	COMPUTER ORGANIZATION AND ARCHITECTURE
Course Code	PBCST404
Course Outcomes	
CO1	Identify the basic structure and functional units of a digital computer and the features of RISC architecture.
CO2	Experiment with the single cycle processor, pipelining, and the associated problems.
CO3	Utilize the memory organization in modern computer systems.
CO4	Experiment with the I/O organization of a digital computer.

Course	SOFTWARE ENGINEERING
Course Code	PECST411
Course Outcomes	
CO1	Plan the system requirements and recommend a suitable software process model
CO2	Model various software patterns based on system requirements
CO3	Apply testing and maintenance strategies on the developed software product to enhance quality
CO4	Develop a software product based on cost, schedule and risk constraints

Course	ENGINEERING ETHICS AND SUSTAINABLE DEVELOPMENT
Course Code	UCHUT347
Course Outcomes	
CO1	Develop the ability to apply the principles of engineering ethics in their professional life.
CO2	Develop the ability to exercise gender-sensitive practices in their professional lives.
CO3	Develop the ability to explore contemporary environmental issues and sustainable practices.
CO4	Develop the ability to analyse the role of engineers in promoting sustainability and climate resilience.
CO5	Develop interest and skills in addressing pertinent environmental and climate-related challenges through a sustainable engineering approach.

Course	OPERATING SYSTEMS LAB
Course Code	PCCSL407
Course Outcomes	
CO1	Illustrate the use of various system calls in Operating Systems.
CO2	Implement process creation and inter-process communication in Operating Systems.
CO3	Compare the performance of various CPU scheduling algorithms.
CO4	Compare the performance of various disk scheduling algorithms.

Course	**DBMS LAB**
Course Code	**PCCSL408**
Course Outcomes	
CO1	Develop database schema for a given real world problem-domain using standard design and modeling approaches.
CO2	Construct queries using SQL for database creation, interaction, modification, and updation.
CO3	Plan and implement triggers and cursors, procedures, functions, and control structures using PL/SQL.
CO4	Perform CRUD operations in NoSQL Databases
CO5	Design database applications using front-end tools and back-end DBMS.