

Department of COMPUTER Engineering
Course Outcomes

Year	Course Name	Course Outcome No.	Course Outcome
SE	Data Structures	CO1	Understand and Analyze various types of data structures and algorithms
		CO2	Apply various sorting and searching algorithms for given problem
		CO3	Make Use of Stacks and Queues to solve the given problem
		CO4	Analyze different hashing techniques and collision resolution strategies.
		CO5	Demonstrate basic operations on trees and graphs
SE	Object Oriented programming and Computer Graphics	CO1	Apply fundamental programming constructs, object oriented constructs in Java for Implementing an application.
		CO2	Apply fundamental object oriented constructs like class, objects, array of objects in Java for Implementing an application.
		CO3	Apply object-oriented features like Inheritance, Polymorphism, Dynamic binding, Exception handling, multi-threading in Java for implementing an application
		CO4	Understand basic concepts in computer graphics and implement them by applying object oriented features
		CO5	Understand mathematical foundation in 2D, 3D Transformation, Projections and implement them by applying object oriented features
SE	Operating Systems	CO1	Analyze the fundamentals of Operating Systems, including types, structures, system calls, and basic Linux commands.
		CO2	Apply process scheduling and synchronization to optimize CPU utilization in modern operating systems.
		CO3	Identify the mechanism for dealing with deadlocks and concurrency concerns.
		CO4	Apply techniques of memory management to solve memory management problems
		CO5	Illustrate I/O and file management policies.
SE	Data Structures Laboratory	CO1	Analyze basic searching and sorting algorithms to solve problems and evaluate their efficiency in different scenarios.
		CO2	Make use of stacks and queue concepts to solve the given problem
		CO3	Demonstrate various types of linked lists.
		CO4	Demonstrate basic operations on trees and graphs and determine minimum spanning.
		CO5	Apply a suitable data structure for solving application-based problems.
SE	Object Oriented programming and Computer Graphics Laboratory	CO1	To apply fundamental programming constructs in Java for implementing an application.
		CO2	To apply fundamental object oriented constructs in Java for implementing an application.
		CO3	To apply object-oriented features like Inheritance, Polymorphism, Dynamic binding, exception handling, multi-threading in Java for implementing an application.
		CO4	To implement basic concepts in computer graphics by applying object oriented features
		CO5	To implement 2D, 3D Transformation, Projections by applying object oriented features
SE	Entrepreneurship Development	CO1	Describe the role of entrepreneurship in economic growth and the startup ecosystem.
		CO2	Apply creative techniques to viable business ideas based on customer needs.
		CO3	Develop a basic business model using tools like the Business Model Canvas through market research.
		CO4	Implement basic marketing strategies for startups.
		CO5	Deliver a concise business pitch using storytelling and effective communication techniques.
SE	Universal Human Values and Professional Ethics	CO1	Recognize the concept of self-exploration as the process of value education and see they have the potential to explore on their own right.
		CO2	Explore the human being as the coexistence of self and body to see their real needs / basic aspirations clearly.
		CO3	Explain relationship between one self and the other self as the essential part of relationship and harmony in the family.
		CO4	Interpret the interconnectedness, harmony and mutual fulfilment inherent in the nature and the entire existence and draw ethical conclusions in the light of Right understanding
SE	Community Engagement Project	CO1	Establish a mutually beneficial relationship between the college and the community
		CO2	Opportunities to engage with their local community, fostering empathy, teamwork, and problem solving skills while contributing positively to their surroundings.
		CO3	An understanding of the challenges faced by the local community and the role of engineering in addressing those challenges.
		CO4	The ability to apply technical knowledge and skills to design solutions or interventions that create a positive impact on the community.
		CO5	The skills to evaluate and critically analyze the outcomes of their engagement activities, deriving actionable insights for sustainable impact
SE (SEM-II)			
SE	Database Management Systems	CO1	Explain the fundamentals of database management systems, including data models, ER modeling, and database design.
		CO2	Develop and execute SQL and PL/SQL programs to manage and manipulate relational data.
		CO3	Apply normalization techniques to improve database design and ensure data integrity
		CO4	Analyze transaction management concepts and concurrency control techniques for reliable database systems
		CO5	Evaluate NoSQL database types and explain their suitability for handling unstructured data.
SE	Discrete Mathematics	CO1	Apply and Analyze Set Theory and Propositional Logic
		CO2	Evaluate and Construct Models using Relations and Functions
		CO3	Design and Implement Tree Structures and Network Flow Algorithms
		CO4	Analyze and Develop Solutions using Graph Theory
		CO5	Apply and Solve Problems using Counting Principles, Understand Algebraic structures
SE	Computer Organization and	CO1	Understand and analyze computer system design and historical development of computers and foundational architectures like Von Neumann and Harvard.
		CO2	To design and optimize internal, and external memory systems for high-performance computing.

	Microprocessor	CO3	To understand fundamental knowledge of the 8086-microprocessor architecture, programming model, addressing modes, and instruction set.
		CO4	To understand memory management, I/O operations and interrupt handling, including address translation, memory banks and interrupt controllers.
		CO5	To explore the multiprocessor systems, Flynn's Taxonomy and RISC design principles, including memory architectures
SE	Database Management Laboratory	CO1	Apply the concepts of database design by creating E-R diagrams and converting them into relational models.
		CO2	Develop and execute SQL queries for data manipulation, transaction control, and access management using DML, DCL, and TCL commands.
		CO3	Analyze and implement SQL operations, including joins, views, subqueries, stored procedures, and triggers, to optimize data retrieval and integrity.
		CO4	Design and Implement CRUD operations in MongoDB, demonstrating an understanding of NoSQL database concepts and their practical applications.
SE	Microprocessor Lab	CO1	Understand and apply various addressing modes and instruction set to implement assembly language programs
		CO2	Apply logic to implement code conversion
		CO3	Analyze and apply logic to demonstrate processor mode of operation
SE	Internet of Things	CO1	Understand fundamental and ecosystem of IoT.
		CO2	Interface different sensors and actuators with IoT development boards.
		CO3	Illustrate different layers of IoT protocols.
		CO4	Use of cloud and its services
		CO5	Apply and develop domain specific IoT applications.
SE	Web Development	CO1	Explain the fundamentals of Internet architecture, protocols, and client-server interactions
		CO2	Design responsive web pages using HTML, CSS, and Bootstrap frameworks
		CO3	Apply JavaScript and DOM to create dynamic and interactive web content
		CO4	Develop server-side functionality using PHP for dynamic content generation and form handling
SE	Environmental Studies	CO1	Illustrate the interdependence of ecosystems through activity-based exploration
		CO2	Analyze the role of natural resources in sustainable development using real-world data.
		CO3	Investigate biodiversity threats and conservation strategies through surveys and projects
		CO4	Create awareness tools or reports promoting sustainability based on their findings.
TE(SEM I)			
TE	Artificial Intelligence	CO1	Explain AI concepts, intelligent agents and ethics.
		CO2	Formulate problems using search techniques.
		CO3	Implement adversarial search and CSP techniques.
		CO4	Apply logic and inference mechanisms.
		CO5	Apply AI planning techniques
TE	Computer Networks	CO1	CO1: Explain network architecture and protocols.
		CO2	CO2: Apply error detection and reliable transmission.
		CO3	CO3: Analyze routing and Internet protocols.
		CO4	CO4: Compare TCP, UDP and congestion control.
		CO5	CO5: Apply application layer protocols.
TE	Theory of Computation	CO1	CO1: Design finite automata.
		CO2	CO2: Construct regular expressions.
		CO3	CO3: Design context-free grammars.
		CO4	CO4: Construct pushdown automata.
		CO5	CO5: Analyze Turing machines and computability
TE	Artificial Intelligence Laboratory	CO1	CO1: Explain AI concepts and methodologies.
		CO2	CO2: Design and implement AI algorithms.
		CO3	CO3: Model real-world AI problems.
		CO4	CO4: Apply AI planning techniques.
TE	Data Mining & Data Warehousing (Elective)	CO1	CO1: Understand data warehouse architecture.
		CO2	CO2: Apply OLAP operations.
		CO3	CO3: Implement data mining techniques.
		CO4	CO4: Analyze association and classification.
		CO5	CO5: Apply clustering and predictive analytics.
TE	Cloud Computing (Elective)	CO1	CO1: Explain cloud architecture.
		CO2	CO2: Analyze virtualization.
		CO3	CO3: Apply cloud service models.
		CO4	CO4: Implement cloud deployment models.
		CO5	CO5: Design cloud-based applications.
TE	Mobile Computing (Elective)	CO1	CO1: Explain mobile communication concepts.
		CO2	CO2: Analyze wireless technologies.
		CO3	CO3: Apply mobile network protocols.
		CO4	CO4: Design mobile applications.
		CO5	CO5: Evaluate mobile security issues.

TE	Embedded Systems (Elective)	CO1	CO1: Explain embedded system architecture.
		CO2	CO2: Analyze microcontroller systems.
		CO3	CO3: Design embedded applications.
		CO4	CO4: Apply interfacing concepts.
		CO5	CO5: Develop real-time embedded solutions.
TE	Robotics & Automation	CO1	CO1: Explain robotics fundamentals.
		CO2	CO2: Analyze robot kinematics.
		CO3	CO3: Apply sensors and actuators.
		CO4	CO4: Program robotic systems.
		CO5	CO5: Design automation solutions.
TE	Technical Seminar	CO1	CO1: Identify emerging technical topics.
		CO2	CO2: Analyze research papers.
		CO3	CO3: Demonstrate presentation skills.
		CO4	CO4: Prepare technical reports.
		CO5	CO5: Use modern seminar preparation tools
TE (SEM - II)			
TE	Machine Learning	CO1	CO1: Explain machine learning concepts.
		CO2	CO2: Apply supervised learning algorithms.
		CO3	CO3: Apply unsupervised learning techniques.
		CO4	CO4: Evaluate machine learning models.
		CO5	CO5: Develop ML-based applications
TE	Software Engineering & Modelling	CO1	CO1: Explain software engineering principles.
		CO2	CO2: Analyze software requirements.
		CO3	CO3: Design UML models.
		CO4	CO4: Apply software testing and quality assurance.
		CO5	CO5: Evaluate software project management practices.
TE	Quantum Computing (Elective)	CO1	CO1: Explain quantum computing fundamentals.
		CO2	CO2: Analyze quantum gates and circuits.
		CO3	CO3: Apply quantum algorithms.
		CO4	CO4: Evaluate quantum applications.
		CO5	CO5: Compare classical and quantum computing.
TE	Distributed Systems (Elective)	CO1	CO1: Explain distributed system architecture.
		CO2	CO2: Analyze communication mechanisms.
		CO3	CO3: Apply synchronization techniques.
		CO4	CO4: Evaluate fault tolerance methods.
		CO5	CO5: Design distributed applications.
TE	UX/UI Design (Elective)	CO1	CO1: Explain UX principles.
		CO2	CO2: Design user interfaces.
		CO3	CO3: Conduct usability analysis.
		CO4	CO4: Apply prototyping tools.
		CO5	CO5: Develop user-centric applications.
TE	System Programming (Elective)	CO1	CO1: Explain system software concepts.
		CO2	CO2: Apply assembler and linker concepts.
		CO3	CO3: Analyze loaders and macros.
		CO4	CO4: Develop system utilities.
		CO5	CO5: Evaluate system programming techniques.
TE	Information Retrieval (Elective)	CO1	CO1: Explain information retrieval concepts.
		CO2	CO2: Apply indexing techniques.
		CO3	CO3: Analyze retrieval models.
		CO4	CO4: Evaluate search engines.
		CO5	CO5: Design retrieval systems.
TE	Data Visualization & Analytics	CO1	CO1: Understand data analytics lifecycle.
		CO2	CO2: Apply statistical techniques.
		CO3	CO3: Implement predictive analytics.
		CO4	CO4: Analyze text data and ML models.
		CO5	CO5: Implement data visualization.
		CO6	CO6: Design Big Data solutions.
TE	Cryptography and Network Security	CO1	CO1: Understand cryptography and security concepts.
		CO2	CO2: Analyze encryption algorithms.
		CO3	CO3: Implement authentication and key management.
		CO4	CO4: Evaluate security threats and vulnerabilities.

		CO5	CO5: Analyze network security mechanisms.
TE	Advanced Databases	CO1	CO1: Analyze advanced database architectures.
		CO2	CO2: Evaluate query optimization.
		CO3	CO3: Analyze transaction management.
		CO4	CO4: Design distributed databases.
		CO5	CO5: Implement database security
BE (SEM - I)			
BE	Design and Analysis of Algorithms	CO1	CO1: Formulate the problem.
		CO2	CO2: Analyze the asymptotic performance of algorithms
		CO3	CO3: Decide and apply algorithmic strategies to solve given problem
		CO4	CO4: Find optimal solution by applying various methods
		CO5	CO5: Analyze and Apply Scheduling and Sorting Algorithms.
		CO6	CO6: Solve problems for multi-core or distributed or concurrent environments
BE	Machine Learning	CO1	CO1: Identify the needs and challenges of machine learning for real-time applications.
		CO2	CO2: Apply various data preprocessing techniques to simplify and speed up machine learning algorithms.
		CO3	CO3: Select and apply appropriate supervised machine learning algorithms for real-time applications.
		CO4	CO4: Implement variants of multiclass classifiers and measure their performance.
		CO5	CO5: Compare and contrast different clustering algorithms.
		CO6	CO6: Design a neural network for solving engineering problems.
BE	Blockchain Technology	CO1	CO1: Interpret the fundamentals and basic concepts of Blockchain.
		CO2	CO2: Compare the working of different Blockchain platforms.
		CO3	CO3: Use crypto wallets for cryptocurrency-based transactions.
		CO4	CO4: Analyze the importance of Blockchain in solving real-world problems.
		CO5	CO5: Illustrate the Ethereum public Blockchain platform.
		CO6	CO6: Identify applications where Blockchain technology can be effectively implemented.
BE	Pervasive Computing (ELECTIVE)	CO1	CO1: Demonstrate the fundamental concepts of pervasive computing.
		CO2	CO2: Explain pervasive devices and select appropriate devices for real-time applications.
		CO3	CO3: Classify and analyze context-aware systems for different ICT applications.
		CO4	CO4: Illustrate intelligent systems and intelligent interactive applications.
		CO5	CO5: Design HCI systems in a pervasive computing environment.
		CO6	CO6: Explore security challenges and understand the role of ethics in pervasive computing.
BE	Multimedia Techniques (ELECTIVE)	CO1	CO1: Describe multimedia components and supporting devices.
		CO2	CO2: Demonstrate content-based information analysis in multimedia systems.
		CO3	CO3: Critique multimedia presentations based on audio, video, graphics, and presentation concepts.
		CO4	CO4: Implement multimedia applications using authoring systems.
		CO5	CO5: Understand technologies for tracking, navigation, and gestural control.
		CO6	CO6: Implement Multimedia Internet of Things (M-IoT) architectures.
BE	Cyber Security and Digital Forensics (ELECTIVE)	CO1	CO1: Analyze cyber threats to protect systems against cyber-attacks.
		CO2	CO2: Build appropriate security solutions against cyber-attacks.
		CO3	CO3: Explain the need for digital forensics and the role of digital evidence.
		CO4	CO4: Explain the rules and methods of evidence collection.
		CO5	CO5: Analyze, validate, and process digital crime scenes.
		CO6	CO6: Identify methods for generating legal evidence and preparing investigation reports.
BE	Object-Oriented Modeling and Design	CO1	CO1: Describe object-oriented concepts and basic class modeling.
		CO2	CO2: Draw class diagrams, sequence diagrams, and interaction diagrams.
		CO3	CO3: Choose and apply suitable design patterns for software problems.
		CO4	CO4: Analyze applications, architectural styles, and software control strategies.
		CO5	CO5: Develop class design models and work with legacy systems.
		CO6	CO6: Understand software design patterns
BE	Laboratory Practice III	CO1	CO1: Apply preprocessing techniques on datasets CO4: Analyze performance of an algorithm.
		CO2	CO2: Implement and evaluate linear regression and random forest regression models.
		CO3	CO3: Apply and evaluate classification and clustering techniques.
		CO4	CO4: Analyze performance of an algorithm.
		CO5	CO5: Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.
		CO6	CO6: Interpret the basic concepts in Blockchain technology and its applications
BE	Laboratory Practice IV	CO1	CO1: Apply Android application development for solving real-life problems.
		CO2	CO2: Design and develop systems using various multimedia components.
		CO3	CO3: Identify various vulnerabilities and demonstrate them using different security tools.
		CO4	CO4: Apply information retrieval tools for natural language processing.
		CO5	CO5: Develop applications using open-source GPU programming languages.
		CO6	CO6: Apply software testing tools to perform automated testing.

BE	Project Work Stage I	CO1	CO1: Solve real-life engineering problems by applying acquired knowledge.
		CO2	CO2: Analyze alternative approaches and select the most feasible solution.
		CO3	CO3: Prepare precise technical reports and documentation.
		CO4	CO4: Participate effectively in multidisciplinary teams and demonstrate teamwork.
		CO5	CO5: Demonstrate interpersonal skills, conflict management, and leadership qualities
BE (SEM - II)			
BE	High Performance Computing	CO1	CO1: Understand various Parallel Paradigm
		CO2	CO2: Design and Develop an efficient parallel algorithm to solve given problem
		CO3	CO3: Illustrate data communication operations on various parallel architecture
		CO4	CO4: Analyze and measure performance of modern parallel computing systems
		CO5	CO5: Apply CUDA architecture for parallel programming
		CO6	CO6: Analyze the performance of HPC applications
BE	Deep Learning	CO1	CO1: Understand the basics of Deep Learning and apply the tools to implement deep learning applications
		CO2	CO2: Evaluate the performance of deep learning models (e.g., with respect to the bias-variance trade- off, overfitting and underfitting, estimation of test error).
		CO3	CO3: To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) for implementing Deep Learning models
		CO4	CO4: To implement and apply deep generative models.
		CO5	CO5: Construct and apply on-policy reinforcement learning algorithms
		CO6	CO6:To Understand Reinforcement Learning Process
BE	Software Defined Networks(ELECTIVE)	CO1	CO1: Interpret the need of Software Defined networking solutions.
		CO2	CO2: Analyze different methodologies for sustainable Software Defined Networking solutions.
		CO3	CO3: Select best practices for design, deploy and troubleshoot of next generation networks.
		CO4	CO4: Develop programmability of network elements
		CO5	CO5: Demonstrate virtualization and SDN Controllers using Open Flow protocol
		CO6	CO6: Design and develop various applications of SDN
BE	Business Intelligence(ELECTIVE)	CO1	CO1: Explain Business Intelligence concepts and data warehousing techniques.
		CO2	CO2: Apply ETL processes and multidimensional data models for business decision-making.
		CO3	CO3: Analyze OLAP operations and business analytics techniques.
		CO4	CO4: Develop dashboards and reports using Business Intelligence tools.
		CO5	CO5: Apply data mining and predictive analytics techniques for business problems.
		CO6	CO6: Evaluate Business Intelligence solutions for organizational decision support.
BE	Laboratory Practice V	CO1	CO1: Analyze and measure performance of sequential and parallel algorithms.
		CO2	CO2: Design and Implement solutions for multicore/Distributed/parallel environment.
		CO3	CO3: Identify and apply the suitable algorithms to solve AI/ML problems.
		CO4	CO4: Apply the technique of Deep Neural network for implementing Linear regression and classification.
		CO5	CO5: Apply the technique of Convolution (CNN) for implementing Deep Learning models.
		CO6	CO6: Design and develop Recurrent Neural Network (RNN) for prediction.
BE	Laboratory Practice VI	CO1	CO1: Apply basic principles of elective subjects to problem solving and modeling.
		CO2	CO2: Use tools and techniques in the area of software development to build mini projects
		CO3	CO3: Design and develop applications on subjects of their choice.
		CO4	CO4: Generate and manage deployment, administration & security.
BE	Project Work Stage II	CO1	CO1: Show evidence of independent investigation
		CO2	CO2: Critically analyze the results and their interpretation.
		CO3	CO3: Report and present the original results in an orderly way and placing the open questions in the right perspective.
		CO4	CO4: Link techniques and results from literature as well as actual research and future research lines with the research.
		CO5	CO5: Appreciate practical implications and constraints of the specialist subject