**COURSE OUTCOMES**

**B Tech (CSE)**

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| **S No** | **Class & Semester** | **Course & Course Code** | **COs** | **Course Outcomes** |
| 01 | B Tech III-Sem | **Analog Circuits** | CO 1 | Identify and describe the basic characteristics and operation principles of diodes, BJTs, and FETs and applications in circuits. |
| CO2 | Explain the various amplifier configurations, their features and discuss the importance of bias stability in amplifier design. |
| CO3 | Summarize the concepts of small signal analysis and low-frequency transistor models for different amplifier configurations. |
| CO4 | Design and implement amplifier circuits with specific gain and frequency response requirements using appropriate biasing techniques and configurations. |
| CO5 | Apply feedback principles to analyze the effects of different feedback topologies on amplifier gain and bandwidth. |
| 02 | B Tech III-Sem | **Data Structure and Algorithm** | CO 1 | Define the basic stack operations and describe the representation of stacks using static and dynamic arrays. |
| CO2 | Explain the advantages and disadvantages of different queue implementations and summarize the applications of queues in real-world scenarios. |
| CO3 | Demonstrate the implementation of a single linked list in memory and perform various operations on it. |
| CO4 | Apply different sorting algorithms to a given dataset and compare their performance in terms of time complexity and efficiency. |
| CO5 | Define the basic stack operations and describe the representation of stacks using static and dynamic arrays. |
| 03 | B Tech III-Sem | **Digital Electronics** | CO 1 | Identify and define key concepts related to number systems and codes. |
| CO2 | Explain the principles of Boolean algebra and their applications in simplifying logic expressions. |
| CO3 | Apply minimization techniques to simplify complex Boolean expressions. |
| CO4 | Design combinational circuits such as adders, multiplexers, and decoders using appropriate logic gates based on given specifications. |
| CO5 | Implement sequential circuits using flip-flops and counters. |
| 04 | B Tech III-Sem | **Software Engineering** | CO 1 | Define and explain the fundamental concepts of software life-cycle models. |
| CO2 | Demonstrate comprehension of how requirements are gathered, documented, and validated. |
| CO3 | Implement testing strategies and reviews to ensure that software products meet specified requirements. |
| CO4 | Evaluate potential risks during the software development process and develop plans to manage these risks effectively. |
| CO5 | Assess the effectiveness of various estimation methods in predicting project timelines and resource allocation, providing critical insights into their advantages and limitations. |
| 05 | B Tech III-Sem | **Mathematics III** | CO 1 | Define and describe discrete and continuous random variables |
|  |  |  | CO2 | Explain the concept of probability distribution functions |
|  |  |  | CO3 | Calculate the expected value, variance |
|  |  |  | CO4 | Identify and formulate design problems |
|  |  |  | CO5 | Demonstrate the use of the simplex method and the two-phase method in solving linear programming problems |
| 06 | B Tech III-Sem | **Finance & Accounting** | CO 1 | To adopt the Managerial Economic concepts for decision making and forward planning.  |
|  |  |  | CO2 | To assess the functional relationship between Production and factors of production and able to compute breakeven point to illustrate the various uses of breakeven analysis |
|  |  |  | CO3 | To outline the different types of business organizations and provide a framework for analyzing money in its functions as a medium of exchange.  |
|  |  |  | CO4 | To adopt the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts |
|  |  |  | CO5 | To implement various techniques for assessing the financial position of the business. |
| 07 | B Tech III-Sem | **Indian Constitution** | CO 1 | Identify Key Historical Events That Led To The Making Of The Indian Constitution. |
|  |  |  | CO2 | Explain The Significance Of The Preamble And Its Interpretation In The Context Of Fundamental Rights And Duties. |
|  |  |  | CO3 | Demonstrate How Fundamental Rights Can be Applied In Real-Life Scenarios, Analyzing Their Impact On Individuals And Society. |
|  |  |  | CO4 | List The Main Structures Of The Indian Union Government |
|  |  |  | CO5 |  Summarize The Roles And Powers Of State Government Officials |
|  | B Tech IV-Sem | **Organizational Behaviour** | CO 1 | Understand and recall fundamental concepts of Organizational Behavior. |
| CO2 | Explain the impact of globalization on OB and the role of knowledge management and learning organizations. |
| CO3 | Explain how diversity affects organizational culture, innovation, and competitiveness. |
| CO4 | Explain the process of communication and its role in organizational success. |
| CO5 | Use OB concepts to diagnose and address issues in organizations (e.g., employee motivation, communication breakdown, and conflict). |
|  | B Tech IV-Sem | **Biology for Engineers** | CO 1 | Identify and list the fundamental concepts of cellular biology |
|  |  |  | CO2 | Explain the process of photosynthesis in their own words |
|  |  |  | CO3 | Demonstrate how to use basic biological techniques, |
|  |  |  | CO4 | Recall key terms related to genetics |
|  |  |  | CO5 | Summarize the principles of evolution and natural selection |
|  | B Tech IV-Sem | **Discrete Mathematics** | CO 1 | For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives |
|  |  |  | CO2 | For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference |
|  |  |  | CO3 | For a given a mathematical problem, classify its algebraic structure |
|  |  |  | CO4 | Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra |
|  |  |  | CO5 | Develop the given problem as graph networks and solve with techniques of graph theory. |
|  | B Tech IV-Sem | **Computer Architecture & Organization** | CO 1 | Identify and describe the basic data types used in computer systems. |
|  |  |  | CO2 | Explain the concepts of register transfer language, bus and memory transfers, and the different types of micro-operations.  |
|  |  |  | CO3 | Discuss the role of instruction codes, computer registers, and timing control in basic computer organization.  |
|  |  |  | CO4 | Apply their knowledge to program the basic computer effectively. |
|  |  |  | CO5 | Design a simple control unit using microprogramming techniques.  |
|  | B Tech IV-Sem | **Design & Analysis of Algorithm** | CO 1 | Analyze and implement graph traversal algorithms and utilize these algorithms to determine properties of graphs. |
|  |  |  | CO2 | Apply the greedy paradigm to solve optimization problems by designing algorithms for various scenarios. |
|  |  |  | CO3 | Explain the divide and conquer paradigm, demonstrating its utility in algorithm design.  |
|  |  |  | CO4 | Implement dynamic programming techniques to solve complex. |
|  |  |  | CO5 | Analyze network flow problems using algorithm to determine maximum flow in capacitated networks.  |
|  | B Tech IV-Sem | **Advance Programming** | CO 1 | Understanding the build system: IDE, tools for testing, debugging, profiling, and source code management. |
|  |  |  | CO2 | Students are able to demonstrate proficiency in object-oriented programming. |
|  |  |  | CO3 | Identify and abstract the programming task involved for a given programming problem. |
|  |  |  | CO4 | Learning and using language libraries for building large programs. |
|  |  |  | CO5 | Ability to apply defensive programming techniques (e.g., assertions, exceptions). |
|  | B Tech IV-Sem | **Programming Through Python** | CO 1 | Know the Essential concepts of Python Programming and its real time use.  |
|  |  |  | CO2 | Design algorithms and source code.  |
|  |  |  | CO3 | Use of suitable data structure and logic for problem solving |
|  |  |  | CO4 | Gain proficiency in using Python's built-in data structures  |
|  |  |  | CO5 | Learn to implement decision-making constructs and be able to apply these concepts in various programming scenarios. |
| 10 | B Tech V-Sem | **Introduction to Database** | CO 1 | Ability to design and implement database schema for an application using RDBMS concepts. |
|  |  |  | CO2 | Ability to write SQL queries for tasks of various complexities. |
|  |  |  | CO3 | Ability to write an application program that uses a database system as the backend. |
|  |  |  | CO4 | Understanding of internal working of a DBMS including data storage, indexing, query processing, transaction processing, concurrency control and recovery mechanisms. |
|  |  |  | CO5 | Awareness of non-relational and parallel/distributed data management systems with a focus on scalability. |
| 11 | B Tech V-Sem | **Compiler Design** | CO 1 | To understand the role, functionality and structure of program translation and interpretation in software development. |
|  |  |  | CO2 | To understand the difference between abstraction levels of a high level language and a machine language. |
|  |  |  | CO3 | To understand the role of a sequence of intermediate representations in lowering the level of abstractions in the process of language translation. |
|  |  |  | CO4 | To get a first-hand experience of a practical application of elegant data structures, algorithms, and other core CS concepts such as automata theory. |
|  |  |  | CO5 | To make effective use of tools such as LEX and YACC. |
| 12 | B Tech V-Sem | **Operating System** | CO 1 | To understand the role, functionality and layering of the systems software components |
|  |  |  | CO2 | To understand the design and usage of the OS API and OS mechanisms |
|  |  |  | CO3 | To understand the details of the abstractions and interfaces provided by the OS for program execution and execution requirements --- processes, threads, memory management, files. |
|  |  |  | CO4 | To understand problems arising due to concurrency and related synchronization based solutions. |
|  |  |  | CO5 | Hands-on and practical experience with usage of the OS API and basics of OS mechanisms |
| 13 | B Tech V-Sem | **Data Communication & Computer Network** | CO 1 | Explain the fundamental concepts of networking and the roles of protocols and standards in facilitating communication across networks. |
|  |  |  | CO2 | Demonstrate an understanding of the OSI and TCP/IP models and recognizing the significance of each layer's protocols in real-world networking scenarios. |
|  |  |  | CO3 | Analyze digital and analog signals, understanding their characteristics and limitations in data transmission.  |
|  |  |  | CO4 | Identify various types of errors that can occur during data transmission and apply error detection and correction methods.  |
|  |  |  | CO5 | Explain key networking protocols at different layers. |
| 14 | B Tech V-Sem | **Artificial Intelligence** | CO 1 | Define key concepts related to artificial intelligence. |
|  |  |  | CO2 | Explain the various problem-solving techniques along with their applications in real-world scenarios. |
|  |  |  | CO3 | Summarize the principles of game playing in AI and discuss their effectiveness in solving problems. |
|  |  |  | CO4 | Apply knowledge representation techniques to build a simple knowledge base for an intelligent agent. |
|  |  |  | CO5 | Demonstrate the use of supervised learning algorithms. |
| 15 | B Tech V-Sem | **Information Theory & Coding** | CO 1 | Define and explain fundamental concepts of information theory and mutual information.  |
|  |  |  | CO2 | Apply source coding theorems to design efficient data compression algorithms.  |
|  |  |  | CO3 | Determine the channel capacity of discrete memoryless channels and explain the implications of the Shannon limit on communication systems.  |
|  |  |  | CO4 | Implement and evaluate error detection and correction methods and cyclic codes.  |
|  |  |  | CO5 | Analyze convolutional codes for maximum likelihood decoding.  |
| 16 | B Tech V-Sem | **Essence of Indian Knowledge and Tradition** | CO 1 | Define Key Concepts And Terminologies Related To Indian Knowledge Tradition, Such As "Dharma," "Karma," And "Moksha." |
|  |  |  | CO2 | List Significant Historical Figures In Indian Philosophy And Their Contributions |
|  |  |  | CO3 | Explain The Fundamental Principles Of Indian Epistemology |
|  |  |  | CO4 | Compare And Contrast Different Indian Philosophical Systems |
|  |  |  | CO5 | Apply The Concepts Of Karma And Dharma To Contemporary Ethical Dilemmas |
| 17 | B Tech VI-Sem | **Machine Learning** | CO 1 | Students will be able to identify and define fundamental concepts of machine learning. |
|  |  |  | CO2 | Students will recall the different types of learning algorithms used in machine learning. |
|  |  |  | CO3 | Students will explain the applications of various supervised learning algorithms in real-world scenarios. |
|  |  |  | CO4 | Students will describe various unsupervised learning techniques. |
|  |  |  | CO5 | Students will learn to apply supervised learning algorithms to datasets by implementing models. |
|  | B Tech VI-Sem | **Digital Image Processing** | CO 1 | Students will be able to identify and describe fundamental concepts of digital image processing, including digital image representation, sampling, quantization, and the steps involved in image processing. |
|  |  |  | CO2 | Students will explain various image transformation techniques.  |
|  |  |  | CO3 | Students will discuss the processes involved in image degradation and restoration, including noise models, noise filters, and techniques like inverse filtering and homomorphism filtering. |
|  |  |  | CO4 | Students will apply various image compression techniques. |
|  |  |  | CO5 | Students will learn to apply image segmentation techniques.  |
|  | B Tech VI-Sem | **Information Security Systems** | CO 1 | Identify and describe various classical and modern encryption techniques, including substitution ciphers, transposition ciphers, block ciphers and public key cryptosystems (like RSA and Elgamal).  |
|  |  |  | CO2 | Explain the principles and mechanisms of cryptographic hash functions, message authentication codes (MACs), and digital signatures. |
|  |  |  | CO3 | Learn to apply various encryption techniques to secure data transmission. |
|  |  |  | CO4 | Students will analyze and evaluate different security protocols in terms of their effectiveness against web security threats.  |
|  |  |  | CO5 | Students will design key management and distribution systems. |
|  | B Tech VI-Sem | **Cloud Computing** | CO 1 | Identify and describe the fundamental concepts of cloud computing. |
|  |  |  | CO2 | Explain the cloud computing architecture and service models. |
|  |  |  | CO3 | Discuss the challenges and risks associated with migrating to the cloud. |
|  |  |  | CO4 | Apply cloud programming paradigms in practical scenarios.  |
|  |  |  | CO5 | Utilize virtualization technologies to manage resources in a cloud environment. |
|  | B Tech VI-Sem | **E Commerce** | CO 1 | Define and articulate essential terms and concepts related to e-commerce and enable themself to engage effectively in discussions about e-commerce. |
|  |  |  | CO2 | Explain the benefits of e-commerce for both businesses and consumers. |
|  |  |  | CO3 | Discuss how the Internet and web technologies support various e-commerce activities and explore the role of technologies. |
|  |  |  | CO4 | Analyze different e-business models and evaluate their applications in real-world scenarios.  |
|  |  |  | CO5 | Apply their knowledge by designing and developing a basic e-commerce website, demonstrating proficiency in essential skills. |
|  | B Tech VI-Sem | **Human Computer Interaction** | CO 1 | Articulate the historical evolution of Human-Computer Interaction (HCI) and the transition from traditional software engineering to user-centered design principles. |
|  |  |  | CO2 | Demonstrate proficiency in defining usability and applying its principles in the design of interactive systems.  |
|  |  |  | CO3 | Equipped to utilize various model-based design techniques to analyze user interactions and improve system designs.  |
|  |  |  | CO4 | Acquire skills in prototyping techniquesand will learn to conduct heuristic evaluations, cognitive walkthroughs, and contextual inquiries to assess user experiences effectively. |
|  |  |  | CO5 | Gain knowledge in empirical research methods relevant to HCI and analyzing data to draw meaningful conclusions about user interactions and system effectiveness. |
|  | B Tech VII-Sem | **Cryptography & Network Security** | CO 1 | Explain and apply the fundamental concepts of cryptography and differentiate between symmetric and asymmetric encryption methods. |
|  |  |  | CO2 | Analyze classical encryption techniques and their cryptanalysis methods, including differential and linear cryptanalysis. |
|  |  |  | CO3 | Implement Key Management and Authentication Protocols. |
|  |  |  | CO4 | Evaluate various security protocols used in network security. |
|  |  |  | CO5 | Apply concepts from number theory to analyze public key cryptosystems. |
|  | B Tech VII-Sem | **Wireless Communication & Networks** | CO 1 | Identify and describe the evolution of mobile radio communications from 1G to 5G, including key features and technological advancements associated with each generation. |
|  |  |  | CO2 | Explain the applications of mobile communication systems in various sectors, and differentiate between different types of wireless communication systems, such as GSM and Bluetooth. |
|  |  |  | CO3 | Analyze the concepts of frequency reuse, channel assignment strategies, and handoff strategies in mobile radio systems, discussing their impact on system capacity and coverage. |
|  |  |  | CO4 | Evaluate the effects of transmission impairments such as multipath propagation and fading on analog and digital data transmission in wireless communication systems. |
|  |  |  | CO5 | Compare different medium access control (MAC) schemes, such as TDMA, CSMA, and CDMA, highlighting their advantages and disadvantages in managing wireless communication resources. |
|  | B Tech VII-Sem | **Data Mining and Ware Housing** | CO 1 | Define key terms related to data mining, including its functionalities and core concepts. |
|  |  |  | CO2 | Identify various forms of data preprocessing, such as data cleaning, integration, and transformation. |
|  |  |  | CO3 | Explain the Importance of Data Cleaning and significance of data cleaning processes. |
|  |  |  | CO4 | Summarize the concepts of classification and prediction in data mining. |
|  |  |  | CO5 | Apply different clustering methods to a given dataset to demonstrate their understanding of cluster analysis. |
|  | B Tech VII-Sem | **Computer Graphics & Multimedia Techniques** | CO 1 | Define key concepts related to raster scan displays, storage tube displays, and color monitors. |
|  |  |  | CO2 | Explain the process of refreshing and flickering in displays and how these affect visual output. |
|  |  |  | CO3 | Demonstrate the use of the Cohen-Sutherland line clipping algorithm in practical scenarios involving 2D graphics. |
|  |  |  | CO4 | Summarize the fundamental problems in geometry as they relate to interactive graphics programming. |
|  |  |  | CO5 | Apply transformations such as translation, rotation, and scaling to 2D and 3D objects in a graphics programming environment.  |
|  | B Tech VII-Sem | **Software Testing** | CO 1 | Identify and define key concepts related to software quality and testing. |
|  |  |  | CO2 | Explain the role and objectives of software testing within the software development lifecycle. |
|  |  |  | CO3 | Discuss the differences between white-box and black-box testing techniques. |
|  |  |  | CO4 | Apply various test case selection strategies based on sources of information. |
|  |  |  | CO5 | Implement a simple unit testing framework for a given software module. |
|  | B Tech VII-Sem | **Web Services** | CO 1 | Define the key concepts of Service-Oriented Architecture (SOA). |
|  |  |  | CO2 | Explain the evolution and characteristics of SOA. |
|  |  |  | CO3 | Describe web services technologies and standards. |
|  |  |  | CO4 | Apply service-oriented analysis techniques. |
|  |  |  | CO5 | Implement a basic SOA design using appropriate tools. |
|  | B Tech VIII-Sem | **System Software Engineering** | CO 1 | Compare and contrast machine language, assembly language, and high-level languages, articulating their appropriate use cases in software development. |
|  |  |  | CO2 | Demonstrate the ability to explain the internal and external representation of instructions and data are utilized in programming environments. |
|  |  |  | CO3 | Analyze the specifications of assembly languages and classify different types of assemblers. |
|  |  |  | CO4 | Evaluate the functions and classifications of loaders and linkers. |
|  |  |  | CO5 | Demonstrate proficiency in using macro processors. |
|  | B Tech VIII-Sem | **Mobile Computing** | CO 1 | Recall key concepts of mobile computing and wireless telephony.  |
|  |  |  | CO2 | Explain the air interface and channel structure in GSM.  |
|  |  |  | CO3 | Apply knowledge of channel allocation methods in cellular systems.  |
|  |  |  | CO4 | Analyze the impact of MAC issues on Wireless LAN performance.  |
|  |  |  | CO5 | Discuss security and fault tolerance measures in mobile agent computing.  |
|  | B Tech VIII-Sem | **Distributed Systems** | CO 1 | Identify the key features of distributed systems.  |
|  |  |  | CO2 | Explain the different types of operating systems used in distributed environments.  |
|  |  |  | CO3 | Apply the concepts of distributed computing paradigms to real-world scenarios.  |
|  |  |  | CO4 | Demonstrate the use of message passing for inter-process communication in a distributed system.  |
|  |  |  | CO5 | Analyze the design issues in distributed operating systems and propose solutions. |
|  |  | **Advanced Database Management System** | CO 1 | Comprehend the fundamental nature of database security challenges.  |
|  |  |  | CO2 | Analyze and design access control mechanisms.  |
|  |  |  | CO3 | Understand the principles of query processing and optimization.  |
|  |  |  | CO4 | Design databases specifically for decision support applications. |
|  |  |  | CO5 | Gain insights into distributed databases and the challenges they present.  |