MAHISHADAL RAJ COLLEGE

DEPARTMENT: COMPUTER SCIENCE

A) Program Outcomes (POs)

- *Problem analysis:* Identity, formulate, review research literature, and analyze complex technological and scientific problems by reaching substantiated conclusions using the first principles of mathematics, natural sciences, and computer science.
- *Design/development of solutions:* Design solutions for complex technological and scientific problems, and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental perspectives.
- *Modern tool usage:* Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex technological activities with an understanding of the limitations.
- *Environment and sustainability:* Understand the impact of the professional technical solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- *Ethics:* Apply ethical principles and commit to professional ethics, responsibilities, and norms.
- *Individual and team work:* Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary areas.
- *Communication:* Communicate effectively on complex technological activities with the 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.
- *Project management and finance:* Demonstrate knowledge and understanding of the technology and management principles and apply these individual works as well as to manage projects in multidisciplinary environments.
- *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) Program Specific Outcomes (PSOs)

- Model computational problems by applying mathematical concepts and design solutions using suitable data structures and algorithmic techniques.
- Design and develop solutions by following standard software engineering principles and implementing them by using suitable programming languages and platforms.
- Develop system solutions involving both hardware and software modules.

C) Course Outcomes (COs)

Semester	Paper code & Name	Outcomes
1st	C1T: Programming Fundamentals using C/C++ & C1P: Programming Fundamentals using C/C++ Lab(Practical)	● Develop modular programs using control structures, pointers, arrays, strings, and structures. ● Design and develop solutions to real-world problems using C. ● Develop a structured programming approach. ● Write, debug, and execute programs using advanced features in C.
	C2T: Computer System Architecture & C2P: Computer System Architecture (Practical)	● Learn data conversion techniques. ● Understand the fundamentals of multicore technology and the internal concept of hardware systems. ● Understand the concept of basic gates, and circuit design. ● Understand design procedures of different electronic circuits as per requirement. ● Build experimental setup and test the circuits. ● Develop skills in analyzing test results of given experiments.
	GE-I: Computer Fundamentals	● Familiarize students about the basic fundamental design and building blocks of computer system. ● Learn the Boolean logic, the concept of basic gates, and circuit design.

2nd	C3T: Programming in Java & C3P: Programming in Java Lab (Practical)	● Understand to implement object oriented programming concepts. ● Understand how to design and develop applets. ● Design User Interface using Swing and AWT. ● Understand the concept of packages and study how to implement them. ● Understand how to implement Object Oriented programming concept using basic syntaxes of control Structures, strings, and functions for developing skills of logic building activity.
	C4T: Discrete structures	● Understanding the concepts of discrete mathematics. ● Learning applications of discrete structures in Computer Science. ● Express a logic sentence regarding predicates, quantifiers, and logical connectives. ● Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the inclusion-exclusion principle. ● Demonstrate different traversal methods for trees and graphs. ● Model problems in Computer Science using graphs and trees.
	GE2: Introduction to Database System	● Gain knowledge of database systems and

		database management systems software. ● Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design database schemas based on the model. ● Formulate, using SQL provide solutions to a broad range of query and data update problems.
3rd	C5T: Data Structure & C5P: Data Structure Lab (Practical)	● Understand different methods of organizing large amount of data using data structure. ● Able to choose appropriate data structure as applied to specified problem definition. ● Understand various techniques for the representation of the data in the real world. ● Able to compute the complexity of various algorithms. ● Able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures. ● Able to use linear and non-linear data structures like stacks, queues, linked list, and apply them to solve various problems, etc.
	C6T: Operating System & C6P: Operating System lab(practical)	● Understand the role of operating system as System software. ● Able to compare various algorithms used for memory management, process

		scheduling, file handling, and I/O operations. ● Understand various concepts related to Deadlock to solve problems related to resource allocation. ● To understand the role of Process synchronization in increasing the throughput of the system. ● Understand the concept of process creation, system calls, disk scheduling, etc.
	C7T: Computer Network & C7P: Computer Network lab(practical)	● Understand basic computer network technology. ● Understand and explain the Data Communications System and its components. ● Able to identify the different types of network topologies and protocols. ● Enumerate the layers of the OSI model and TCP/IP, and understand the function(s) of each layer. ● Identify the different types of network devices and their functions within a network. ● Understand the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
	SEC1T: Programming in MATLAB & SEC1P: Software Lab Based on MATLAB	● Understand how to analyze and visualize data. ● Understand how to apply numeric techniques and computer simulations to solve mathematical problems.

		● Learn the matrix-based language that allows the most natural expression of computational mathematics.
	GE3: Introduction to Programming in C/C++	● Develop problem-solving skills coupled with top-down design principles ● Learn about the strategies for writing efficient and well-structured computer programs.
4th	C8T: Design and Analysis of Algorithms & C8P: Design and Analysis of Algorithms lab(Practical)	● Learn good principles of algorithm design ● Learn how to analyze algorithms and estimate their various time complexities. ● Able to apply the algorithms to various problems in a time-efficient way.
	C9T: Software Engineering & C9P: Software Engineering lab(Practical)	● Able to design and conduct experiments, as well as to analyze and interpret data. ● Able to analyze, design, verify, validate, implement, apply, and maintain software systems. ● Able to develop software, and create reports/documentation for real-life projects.
	C10T: Database Management Systems & C10P: Database Management Systems lab(Practical)	● Gain knowledge of database systems and database management systems software. ● Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design database schemas based on the model. ● Formulate, using SQL provide solutions to a

		broad range of query and data update problems.
	GE4T: Programming in Python & GE4P: Programming in Python lab(Practical)	● To familiarize the students with object oriented programming and procedure-oriented programming. ● To familiarize with the software for web application, database handling, etc.
	SEC2T: HTML Programming & SEC2P: Software Lab Based on HTML	● Learn the webpage design using HTML. ● Able to design a basic website using HTML5 and CSS3 to demonstrate responsive web design.
5th	C11T: Advanced Java & C11P: Advanced Java lab(Practical)	● Understand how to use database programming using Java. ● Able to implement web development concepts using Servlet and JSP. ● Able to develop game applications. ● Learn and implement socket programming concepts. ● Understand the use of different exception-handling mechanisms and the concept of multithreading for robust faster and efficient application development. ● Able to identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.
	C12T: Theory of Computation	● Provide a formal connection between algorithmic problem solving and the theory of

		languages and automata, and develop them into a mathematical (abstract) view towards the algorithmic design and in general computation itself. ● Become proficient in key topics of the theory of computation, and have the opportunity to explore the current topics in this area.
	DSE1T: Operational Research & DSE1P: Operational Research Lab (Practical)	● Construct linear integer programming models and discuss the solution techniques. ● Set up decision models and use some solution methods for nonlinear optimization problems. ● Propose the best strategy using decision-making methods under uncertainty and game theory. ● Solve multi-level decision problems using dynamic programming method. ● Formulate pure, mixed, and binary integer programming models. ● Write, debug, and execute programs related to OR.
	DSE2T: Network Programming & DSE2P: Network Programming lab(Practical)	● Understand basic computer network technology. ● Understand the network layer, transport layer, and application layer functions and protocols. ● Understand the design of LAN and the role of network administration.

		● Under the concept of socket programming and implementing client-server models.
6th	C13T: Artificial Intelligence & C13P: Artificial Intelligence Lab (Practical)	● Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solve a given problem. ● Implement basic AI algorithms (e.g., standard search or constraint propagation algorithms). ● Differentiate between supervised and unsupervised machine learning approaches.
	C14T: Computer Graphics & C14P: Computer Graphics lab(Practical)	● Understand how to use graphics objects represented in a computer. ● Able to correlate between user and computer through graphics. ● Able to increase the productivity through graphics. ● Understand the programmer's perspective of working on computer graphics.
	DSE3T: Numerical Methods & DSE3P: Numerical Methods lab(Practical)	● Demonstrate understanding of common numerical methods and apply numerical methods to obtain approximate solutions to mathematical problems. ● Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear

		equations, and the solution of differential equations. ● Analysis and evaluate the accuracy of common numerical methods.
	DSE4T: System Programming & DSE4P: System Programming lab(Practical)	● Able to design the structure of a simple editor. ● Able to design the structure of the Assembler and macro processor for a hypothetical simulated computer. ● Understand the working of linkers and loaders, and other development utilities. ● Understand the complexity of the Operating system as a software.