Name:.....
Roll No:.....

MAR ATHANASIUS COLLEGE OF ENGINEERING (AUTONOMOUS),
KOTHAMANGALAM - 686666
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH SECOND SERIES EXAMINATION, OCTOBER 2026 (S3 CS, DS, AIML)
B24CS2T01 DATA STRUCTURES

Max. Marks: 40 Duration: 1.5 Hours

PART A

Answer all questions. Each question carries 3 marks.

1. **Write** an algorithm to count the number of prime numbers in a Linked List. **(CO 3)**
2. **Compare** singly linked list and doubly linked list. **(CO 3)**
3. **Describe** the linked representation of a binary tree. Detail the essential components typically required within the structure of a single node in this representation. **(CO 4)**
4. In a Binary Tree, the inorder traversal is: 10, 20, 30, 40, 50, 60, 70 and the preorder traversal is: 40, 20, 10, 30, 60, 50, 70. Reconstruct and **draw** the original Binary Tree. **(CO 4)**

PART B

Answer all questions. Each question carries 14 marks.

5. (a) An Operating System allocates memory to dynamic processes using a contiguous memory block. Currently, the available free memory blocks are partitioned as follows: 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order). A sequence of process requests arrives in the following order:
Process P1: Requires 212 KB
Process P2: Requires 417 KB
Process P3: Requires 112 KB
Process P4: Requires 426 KB

   i. Simulate and **show** the memory allocation state using:
      A. First-Fit Allocation Scheme
      B. Best-Fit Allocation Scheme
      C. Worst-Fit Allocation Scheme

VISION

To mould competent computing professionals, innovators, and leaders guided by ethical values and committed to technological advancement and sustainable societal development.

MISSION

- Provide quality education through strong theoretical foundations, experiential learning, and exposure to emerging computing technologies.
- Cultivate critical thinking, research aptitude, and innovation through problem-based learning, industry interaction, and research initiatives.
- Foster ethical values, leadership, social responsibility, and an aspiration for lifelong learning through professional practices, teamwork, and mentoring.

ii. **Identify** which allocation strategy leads to the highest external fragmentation in this scenario. **(CO 3)** (7 marks)

(b) A circular linked list is formed using the characters of a string S. **Write** the code to delete the node that comes immediately after the node containing 'B'. **(CO 3)** (7 marks)

6. (a) Write an algorithm to insert an element into a Binary Search Tree (BST). **Construct** a BST by inserting the following key sequence in order: 11, 6, 19, 4, 8, 15, 22, 2, 7, 10, 13, 17. **(CO4)** (7 marks)

(b) Write algorithms to perform Inorder, Preorder, and Postorder traversals on a binary tree. **List** the traversal outputs for the following tree. **(CO 4)** (7 marks)

