

4 St. Claret College

Autonomous, Bengaluru

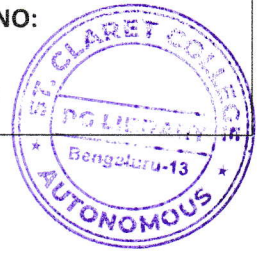
MCA END SEMESTER EXAMINATION-APRIL 2026

MCA: FIRST SEMESTER

MCA 1425: DATA STRUCTURES AND ALGORITHMS

ROLL NO:

DATE:



TIME: 3 hours.

MAX. MARKS: 70

This paper contains TWO printed pages and FOUR parts

Instructions:

1. Verify and ensure that the question paper is completely printed.
2. Any discrepancies or questions about the exam paper must be reported to the COE within 1 hour after the examination.
3. Students must check the course title and course code before answering the questions.

PART-A

Answer any EIGHT questions out of TEN. Each answer carries TWO marks.

[2X8 = 16]

1. Explain primitive and non-primitive data structures.
2. Explain the concept of an Abstract Data Type (ADT).
3. Describe a self-referential structure with an example.
4. Explain the concept of a postfix expression with an example.
5. Identify and state two applications of stacks.
6. Explain the concept of a Binary Search Tree.
7. Explain the concept of AVL Trees .
8. Distinguish between Sequential Search and Binary Search.
9. Explain the concept of collision resolution in hashing.
10. Write the steps involved in Binary Search.

PART-B

Answer any FOUR questions out of SIX. Each answer carries FIVE marks.

[5X4=20]

11. Discuss asymptotic notations with suitable examples.
12. Design an algorithm to evaluate a postfix expression using a stack and illustrate it with an example.
13. Convert the following infix expression into postfix form and show all stack operations
 $3 * 3 / (4 - 1) + 6 * 2$.
14. Explain the properties of Binary Trees with a suitable example for each property.
15. Explain AVL Trees with a suitable example.
16. Explain Sequential Search algorithms with examples.

PART-C

Answer any TWO questions out of FOUR. Each answer TEN marks.

[10X2=20]

17. Explain singly linked list with diagram and write algorithm to insertion operations at the beginning.
18. Describe the Queue Abstract Data Type (ADT). Explain the different types of queues- Circular Queue, Double Ended Queue (Deque), and Priority Queue.
19. Write the algorithms for Inorder, Preorder, and Postorder tree traversals and illustrate them with a suitable example.
20. Explain Binary Search Tree (BST). Write the algorithm for searching an element in a BST with an example.

PART-D

Answer the following question. Answer carries FOURTEEN marks.

[14X1=14]

21. Explain and illustrate the structure and working of Trie and B-Tree data structures. Discuss their applications and advantages in searching operations.
