ST. FRANCIS DE SALES COLLEGE
A FRANSALIAN INSTITUTE OF HIGHER EDUCATION **AUTONOMOUS**

NAAC'A GRADE ● AFFILIATED TO BANGALORE UNIVERSITY ● AICTE APPROVED ● 2(F) & 12 (B) RECOGNITION OF UGC ● ISO 9001:2015 CERTIFIED

📍 Electronics City P.O., Bengaluru – 560 100, Karnataka, INDIA   ☎ (+91) 8088140679 ✉ pro@sfscollege.in ● www.sfscollege.in

END SEMESTER EXAMINATION – APRIL 2025
COMPUTER SCIENCE – I SEMESTER MCA
24MCA12 – DATA STRUCTURES

Time: 3 Hours   **Max. Marks: 70**

Instruction: *Answer should be written completely in English*

SECTION - A

Answer any **FIVE** questions. Each question carries **SIX** marks each.   (5X6=30)

1. What is a sparse matrix? How is it represented in memory?

2. Discuss the significance of stacks in expression evaluation with an example.

3. What is a queue? Explain its basic operations with an example.

4. Compare and contrast circular queue and double-ended queue.

5. Define linked stacks and linked queues. Explain their structure with examples.

6. Explain how graph representations affect the efficiency of graph algorithms.

7. Compare DFS and BFS with example.

8. Compare AVL trees and Red-Black trees in terms of balancing and performance.

SECTION - B

Answer any **FOUR** questions. Each question carries **TEN** marks each.   (4X10=40)

9. Explain the process of adding two polynomials using linked lists. Write an algorithm for the same.

10. Write a program to represent Circular Linked List.

11. Implement a double-ended queue (deque) using a doubly linked list in C.

12. Write a C program to perform insertion and deletion operations on a circular doubly linked list.

13. Explain the concept of an AVL tree. Construct AVL tree for 60,10,20,30,19,120,100,80,19.

14. Compare and contrast B-Trees and B+ Trees in terms of structure and performance.