**D1ACS2502** **(2 Pages)** **Name.....**
**Reg.No.....**

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025**
**(Regular/Improvement/Supplementary)**

**COMPUTER SCIENCE**
**FCSS1C02 – ADVANCED DATA STRUCTURES**

**Time: 3 Hours** **Maximum Weightage: 30**

**Section A: Short answer questions. Answer any *four* questions. Each carries *two* weightage.**

1. What are common Abstract Data Types?
2. Discuss the time complexities of Merge Sort and Quick Sort. Under what conditions would you prefer Merge Sort over Quick Sort and vice versa?
3. Explain the difference between a Binary Tree, Binary Search Tree (BST), and Threaded Binary Tree.
4. Define Hashing? Explain Hash Tables and Hash Functions?
5. Explain the insertion and deletion operations for the circular queue and discuss its advantages over a simple linear queue.
6. Construct a Binomial heap using the numbers 10,4,9,15,22,30.
7. Explain the importance of space and time complexity when evaluating the performance of algorithms.

**(4 × 2 = 8 weightage)**

**Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.**

8. Demonstrate the difference in the procedure of DECREASE-KEY operation in Fibonacci heap and Binomial heap.
9. Explain Red black trees with an example.
10. Write a note on linear probing and quadratic probing.
11. Explain about the implementation of stack operations using linked lists.
12. Write an algorithm to evaluate an arithmetic expression using a stack. Use this to convert the infix expression $(A+B) * (C-D)$ into its postfix form.
13. What is a M-way tree, and how does it differ from a B+ Tree?
14. Explain the objectives of an algorithm.

**(4 × 3 = 12 weightage)**

**(P.T.O.)**

**Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.**

15. What is a binary search tree (BST) and specify the steps showing the construction of a BST for the following data 10, 08, 15, 12, 13, 07, 09, 17, 20, 18, 04, 05.

16. Explain the structure of a binary heap. Illustrate the process of inserting an element into a max-heap and deleting the maximum element from a max-heap.

17. Differentiate between best case, worst case, and average case complexities of an algorithm with an example.

18. Explain different collision resolution techniques in hashing.

**(2 × 5 = 10 weightage)**