

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023
SECOND SEMESTER**

**MCA 202 - DATA STRUCTURES USING JAVA
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common Paper to University and All Affiliated Colleges)**

Time : 3 Hours

Max. Marks : 70

**PART-A
(Compulsory)**

Answer any FIVE of the following questions. Each question carries 4 marks. (5×4=20)

1. a) What is Abstract Data Type? Explain.
- b) Write about the complexity of isempty, isfull, push and pop operations in Stack.
- c) Write algorithm for inorder traversal without recursion.
- d) What is the difference between a binary tree and a binary search tree?
- e) What is the maximum height of any AVL Tree with 7 nodes? Assume that the height of a single node is 0.
- f) What is a Red Black tree? Explain.
- g) Write any five features of B+ Trees.
- h) What is radix sort? Explain with an example.
- i) Write an algorithm for Binary search. What is the worst case complexity?
- j) Is a B-Tree self balancing tree? Justify your answer with an example.

PART - B

Answer Five questions, choosing ONE question from each Unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. i) Discuss about best, average and worst case complexities of selection sort algorithm.
- ii) Convert $A+B*C/D-E+F$ into postfix notation. Explain the procedure and data structures used.

(OR)

3. i) Write an algorithm for polynomial addition using linked lists.
- ii) Discuss atleast two applications each of stacks and queues.

UNIT - II

4. i) Write a program to construct a binary tree for a given set of 'n' nodes.
- ii) Write an algorithm for traversing a binary tree in inorder and postorder.

(OR)

5. i) Write the Dijkstra's algorithm for Single Source Shortest Path Problem.
- ii) Write about UNION-FIND operations.

UNIT - III

6. i) How is an AVL tree different from B-Tree?
- ii) Discuss various operations in Splay Trees with an example.

(OR)

7. i) Discuss about Binary Heap with examples.
- ii) Write about implementation of priority queue using binary heap.

UNIT - IV

8. i) Discuss Merge sort algorithm with an example.
- ii) Write a recursive algorithm for quicksort.

(OR)

9. i) Describe the procedure of K-way merging with example.
- ii) What is the complexity of K-Way merge.

UNIT - V

10. i) Write about Cylinder surface Indexing.
- ii) What is Hash Table? What are its applications?

(OR)

11. i) Explain about different operations on B+ Trees.
- ii) Write Linear search algorithm and explain with an example. Also explain its worst case complexity.