MSCCS-07/MSCCS-201/MSCCSC-201/MCA-201
December - Examination 2025
MSCCS (Final)/MCA (2nd Year) Examination
DATA STRUCTURE AND ALGORITHM
Paper : MSCCS-07/MSCCS-201/MSCCSC-201/MCA-201

[*Time: **3** Hours*] [*Maximum Marks: **80***]

Note :- The question paper is divided into three Sections A, B and C. Write answers as per the given instructions.

Section-A **8×2=16**

(Very Short Answer Type Questions)

Note :- Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries **2** marks.

1. (i) What is an algorithm?
   (ii) Which algorithm is used to find all the shortest paths in a graph?
   (iii) Name various methods to traverse a TREE.
   (iv) What is a Minimum Spanning Tree? Give an example.
   (v) What is a Deque (Double-Ended Queue)? Give an example.
   (vi) State Cook-Levin theorem.
   (vii) Define "Path" and "Cycle" in a graph. Give an example.
   (viii) What is Circular Linked List?

Section-B **4×8=32**

(Short Answer Type Questions)

Note :- Answer **any four** questions. Each answer should not exceed **200** words. Each question carries **8** marks.

2. Explain the difference between Time Complexity and Space Complexity.
3. List and explain the five essential criteria an algorithm must satisfy, such as finiteness and definiteness, with suitable examples.
4. What is Selection Sort? Write its algorithm. Explain with a suitable example.
5. Explain how a stack is used for Parenthesis Matching in mathematical expressions with suitable examples.
6. Explain the Incidence Matrix method for representing a graph. Provide an example matrix for a graph with 3 vertices and 3 edges.
7. Write an algorithm to find the Nth member of the Fibonacci sequence of Nth member. Also, explain the same algorithm with an example.
8. Describe the concept of a Priority Queue and provide two real-world applications where it is utilized.
9. Explain Linear search with the help of a suitable example.

Section-C

2×16=32

(Long Answer Type Questions)

Note :- Answer **any two** questions. You have to delimit your each answer maximum up to **500** words. Each question carries **16** marks.

10. Write a C**++** program or detailed pseudocode to create a Singly Linked List and perform a search operation for a specific item.

11. Define an AVL Tree. Show the steps and rotations required to rebalance a tree when a node is inserted that violated the AVL property.

12. Explain the Tower of Hanoi problem. Describe the algorithm and how Stacks a utilized to solve it.

13. Consider a 2D array Realarr. If the base address is 1000 and each element requires 4 bytes, calculate the address of element Realarr using the Row-Major formula.
