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MCS–208

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS

(PGDCA-NEW)

Term-End Examination

June, 2026

MCS-208 : DATA STRUCTURES AND ALGORITHMS

Time : 3 Hours *Maximum Marks : 100*

Weightage : 70%

***Note** :(i) Question No. **1** is compulsory.*

*(ii) Attempt any **three** questions from the rest.*

(iii) All algorithms should be written nearer to 'C' language.

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1. (a) What is algorithm ? Explain the meaning of time complexity of an algorithm. Write binary search algorithm and calculate its time complexity. 10

   (b) What is stack ? Write algorithm to check whether stack is empty or not. 5

   (c) What is Red-Black tree ? Write its properties. 5

   (d) What is Binary Tree ? Write algorithm for Inorder traversal of Binary Tree. 10

   (e) What is Direct File Organization (DFO) ? Explain the use of hashing and hash function in DFO with the help of an example. 10

2. (a) Write algorithm for Depth First Search. 5

(b) Write algorithm for deleting element from a circular queue. 5

(c) Convert the following infix-expression into prefix and postfix expressions : 10

$$(a + (b * c) * (d/e))$$

3. (a) What is sparse matrix ? Explain how sparse matrix can be stored in memory for efficient performance, using an example. 10

(b) What is graph ? Explain adjacency list representation of a graph with an example. 5

(c) What is sequential file organization ? Explain its advantages. 5

4. (a) What is AVL tree ? Write algorithms for :

   (i) Insertion of a node into an AVL tree 5

   (ii) Deletion of a node from an AVL-tree 5

   (b) Write algorithm for Insertion Sort. Sort the following list, using Insertion Sort, showing intermediate steps : 10

   8 20 15 28 9

5. (a) What is Queue ? Write algorithm for addition of an element to the Queue. 5

   (b) Write algorithm for deleting element from a doubly linked list. 5

   (c) Write Prim's algorithm to find Minimum Cost Spanning Tree (MCST) and explain it. 10

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