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MCS–208

POST GRADUATE DIPLOMA IN COMPUTER APPLICATION (PGDCA)

Term-End Examination

June, 2025

MCS-208 : DATA STRUCTURES AND ALGORITHMS

Time : 3 Hours *Maximum Marks : 100*

***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 are arrays ? Write an algorithm for addition of *two* matrices. 10

(b) Describe the implementation of a queue using a linked list. 10

(c) Write non-recursive algorithm for postorder traversal of a binary tree. Explain with the help of an example. 10

(d) Explain what is collision in the context of 'hashing'. What methods can be employed to address collisions ? 10

2. (a) What is Depth First Search (DFS) ? How does it differ from Breadth First Search (BFS) ? Give examples for DFS and BFS. 10

(b) What is a time complexity ? How does it differ from space complexity ? Give an example for each to calculate time complexity and space complexity. 10

3. (a) Explain stack implementation using an array. What are the advantages and limitations of this approach ? Illustrate it with the help of an example. 10

(b) What are singly linked lists ? Write an algorithm to count the number of items stored in a single linked list. 10

4. (a) Explain Kruskal's algorithm for finding minimum cost spanning tree in a graph with the help of an example. 10

(b) What are the characteristics of an AVL tree ? How do rotations help in balancing an AVL tree when it becomes unbalanced ? 10

5. (a) Convert the following expressions to postfix : 10

(i) $(a * b \wedge c) / (d - e)$

(ii) $(a+b)(c+d \wedge e)$

(b) Write an algorithm for quick sort. Sort the following set of data in ascending order using quick sort. Show all steps of application of the algorithm : 10

10, 5, 6, 7, 15, 8

Write the best case and worst case time complexities.

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