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MCS–021

MASTER OF COMPUTER APPLICATIONS (MCA)

(REVISED)

Term-End Examination

June, 2025

MCS-021 : DATA AND FILE STRUCTURES

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 near to 'C' language.

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1. (a) Describe the definition of an algorithm in brief. Describe the trade off between the time and space complexity using illustrative example. 8

   (b) Write an algorithm for the following :

      (i) Insert an element at the beginning of a linked list. 5

      (ii) Delete an element from the end in a linked list. 5

   (c) Describe dequeue. Explain how the dequeue can be implemented using arrays. 10

   (d) Write and explain Dijkstra's algorithm for finding shortest route in a graph. Explain the algorithm in terms of complexity. 12

2. (a) Write an algorithm for merge sort. Write step-by-step working of their algorithm for sorting the following list of data : 10

8, 12, 26, 7, 15, 24, 1, 40

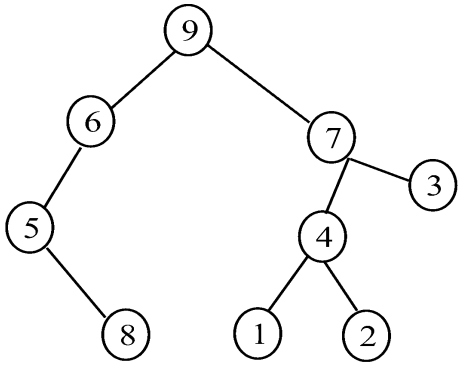
(b) Draw AVL tree by inserting the following elements one by one : 10

7, 14, 26, 10, 11, 19, 12, 34, 26

3. (a) Write an algorithm for addition of two polynomials. 10

(b) Explain indexed sequential file organization. Compare static *vs.* dynamic approaches to implement indexes with explanation. 10

4. (a) Tranverse the following binary tree in pre-order and post-order : 5



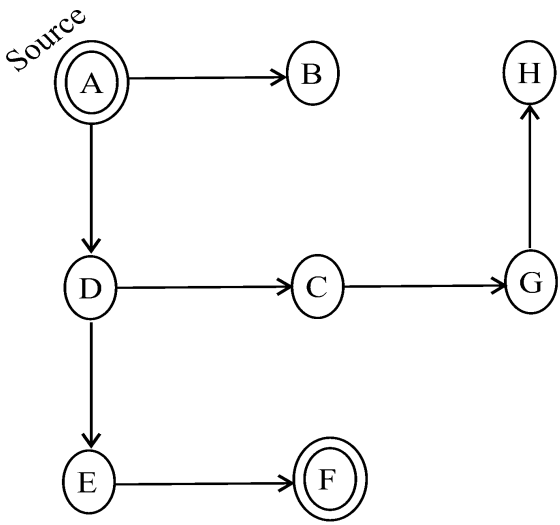
(b) Draw the binary tree, if the pre-order traversal and inorder traversal are as follows : 5

Preorder : A B H C D E F G

Inorder : B H A D C F E G

(c) What is a red-black tree ? Explain how it is different from a binary search tree. 10

5. (a) Traverse the following diagraph using Breadth First Search (BFS) and Depth First Search (DFS) : 10



(b) What is sparse matrix ? Write algorithm to implement sparse matrix using 3-tuple form. 10

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