MCA (Revised) / BCA (Revised)

Term-End Examination

December, 2022

MCS-021 : DATA AND FILE STRUCTURES

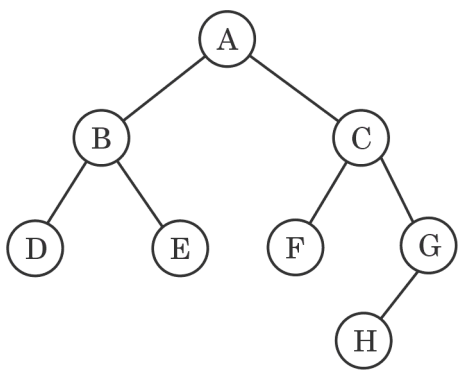
Time : 3 hours *Maximum Marks : 100*

(Weightage : 75%)

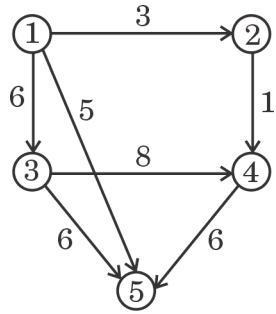
Note : *Question number **1** is **compulsory**. Attempt any **three** questions from the rest. All algorithms should be written near to 'C' language.*

1. (a) Write an algorithm of 2-way Merge Sort. Also discuss the advantage and disadvantage of 2-way Merge Sort. Also calculate its time complexity. *10*

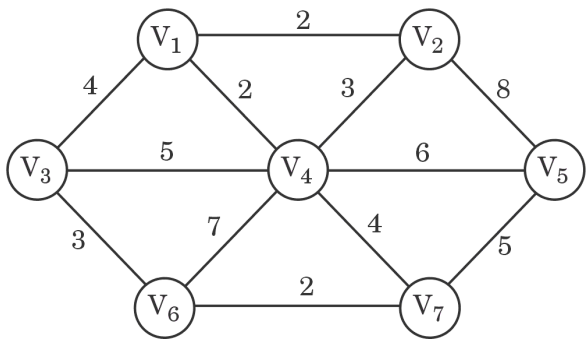
(b) Traverse the following Binary tree in Pre-order and Post-order : *10*



(c) Write the steps involved to find the shortest path from Vertex '1' of the graph given below by using Dijkstra's algorithm : *10*



(d) Write an algorithm to implement Depth First Search (DFS) method. Use the DFS method to traverse the following graph, with Vertex V_1 as the source vertex : *10*



2. (a) Write short notes on the following : *10*

(i) Sequential File Organization

(ii) Indexed Sequential File Organization

(b) Differentiate between the following : $4 \times 2\frac{1}{2} = 10$

(i) Heap and Tree

(ii) B-Tree and Binary Tree

(iii) B-Tree and B^+-Tree

(iv) Binary Tree and Binary Search Tree

3. (a) What is a Red-Black tree ? Explain its properties. *5*

(b) Write an algorithm of Binary Search. *5*

(c) Write Selection Sort algorithm. Sort the following list using Selection Sort in descending order : *5*

25, 10, 50, 21, 65, 18, 45

(d) Let 'E' denote the following algebraic expression :

$[a + (b - c)] * [(d - e) / (f + g - h)]$

Draw the Binary tree for 'E'. *5*

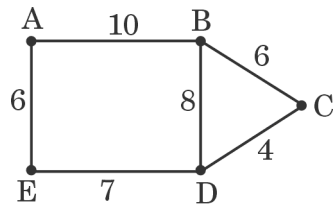
4. (a) Compute the time complexity of Bubble Sort and Quick Sort algorithm. Verify the statement "Best case for Bubble Sort is worst case for Quick Sort". *10*

(b) Write algorithm and Pseudo code for the following : *10*

(i) Inserting an element in a doubly linked list.

(ii) Deleting an element from a doubly linked list.

5. (a) Write Kruskal's algorithm. Find the Minimum Cost Spanning Tree of the graph given below using Kruskal's algorithm : *10*



(b) What is AVL Tree ? Discuss the mechanism of the following rotations used in AVL tree : *10*

(i) LL

(ii) LR

(iii) RR

(iv) RL