0402E1413

Candidate's Seat No :_____

MSc Sem.-1 Examination

403

Computer Science

February-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Q1(A) Define a graph. Differentiate between directed and undirected graphs with examples. (7)

Q1(B) Explain Depth-First Search (DFS) with an example. Show the step-by-step traversal for a given graph. (7)

OR

Q1(A) Describe Breadth-First Search (BFS) and perform BFS on a graph with a suitable example. (7)

Q1(B) Explain the Branch and Bound method in graph search. Discuss one of its applications. (7)

Q2(A) Illustrate the process of Topological Sorting with an example. (7)

Q2(B) Explain Dijkstra's algorithm for finding the shortest path. Demonstrate the algorithm with an example. (7)

OR

Q2(A) Differentiate between Prim's and Kruskal's algorithms for finding a Minimum Cost Spanning Tree. (7)

Q2(B) Apply Prim's algorithm on a given weighted graph to find its Minimum Cost Spanning Tree. (7)

Q3(A) Apply Kruskal's algorithm on a given weighted graph to find its Minimum Cost Spanning Tree. (7)

Q3(B) Explain the concept of Critical Path Analysis in project management. Solve a numerical problem involving Critical Path Analysis. (7)

OR

Q3(A) Define a binary tree and discuss its properties. (7)

Q3(B) Differentiate between Binary Trees and N-ary Trees with examples. (7)

Q4(A) Perform Inorder, Preorder, and Postorder traversals on a given binary tree and explain each step. (7)

Q4(B) Define a search tree. Explain the difference between Binary Search Tree and AVL Tree. (7)

OR

Q4(A) Discuss the concept of balancing in AVL Trees. Insert a set of keys into an AVL Tree and show the rotations performed. (7)

Q4(B) Explain the structure and operations of a B-Tree. Construct a B-Tree for a given sequence of keys. (7)

Q5 **True/False Attempt any seven out of twelve.(2 Marks each)** **(14)**

1) A graph with vertices connected by edges is called a tree.
2) Depth-First Search (DFS) visits vertices in a level-by-level manner.
3) Breadth-First Search (BFS) can be implemented using a queue.
4) In the Branch and Bound method, the solution is always optimal.

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5) Topological sorting can be applied to a directed acyclic graph (DAG) only.
6) Dijkstra's algorithm can handle negative edge weights.
7) Prim's algorithm is a greedy algorithm used to find the Minimum Spanning Tree (MST).
8) Kruskal's algorithm works by selecting the edge with the highest weight for the MST.
9) In Dijkstra's algorithm, the shortest path is always found by choosing the vertex with the minimum known distance.
10) Critical Path Analysis is used to find the longest path in a project scheduling problem.
11) A binary tree can have at most two children per node.
12) In an N-ary tree, each node can have any number of children.

BEST OF LUCK