0402E1422

Candidate's Seat No :_____

MSc Sem.-1 Examination

403

Data Science

February-2025

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

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

Q.1 **(a)** Write an algorithm/program to implement quick sort. **(07)**

(b) What is Binary Search? Show tracing of searching 35 from the given data. **(07)**

5, 10, 15, 20, 25, 30, 35, 40, 45, 50

OR

(a) What is a doubly linked list? Write an algorithm/function to create it. **(07)**

(b) Convert the given Infix expression to postfix: 4 $ 2 * 3 – 3 + 8 / 4 / (1 + 1). **(07)**

Q.2 **(a)** What is Queue? Write an algorithm/program to implement a circular queue. **(07)**

(b) Discuss the Dequeue data structure in brief. **(07)**

OR

(a) Discuss different file organizations in detail. **(07)**

(b) Explain hash table and hash function with an example. **(07)**

Q.3 **(a)** Draw a BST from the given traversal data: **(07)**

Preorder: 57, 45, 18, 9, 20, 50, 55, 75, 60, 59, 62, 85, 95

Inorder: 9, 18, 20, 45, 50, 55, 57, 59, 60, 62, 75, 85, 95

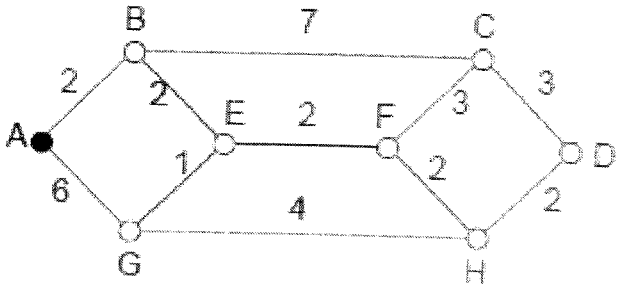
(b) What is AVL Tree? Construct the AVL-Tree from the given data: **(07)**

5, 12, 10, 9, 8, 14, 23, 29, 28, 17, 11

OR

(a) What is Graph? Discuss representation methods of Graph theory. **(07)**

(b) Find a shortest path, from vertex A to vertex D, in the given graph using Dijkstra algorithm. **(07)**



Q.4 **(a)** Define Growth of Functions. Define the Asymptotic Notations: Big-oh (O), Big-Omega (ω), Big-Theta (θ) with its graphical representation. **(07)**

(b) State Master method for solving recurrences. Using Master's method find the worst time complexity of the recurrence $T(n) = 7T\left(\frac{n}{2}\right) + 18n^2$ **(07)**

OR

(P.T.O)

(a) What is Clique? Prove that Clique decision problem is NP-complete. **(07)**

(b) Define NP-Complete and NP-Hard problems. Explain with diagram the concept of P, NP, NP-Complete and NP-Hard. **(07)**

Q.5 Attempt any **SEVEN** out of **TWELVE:** **(14)**

(1) DFS stands for _____.

(2) Kruskal algorithm is used to find _____ from a graph.

(3) Visit sequence for pre-order traversal in BST is _____.

(4) _____ data structure is used to perform backtracking.

(5) The worst-case complexity for the binary search algorithm is _____.

(6) The process where the function calls itself is called _____.

(7) _____ data structure can be used to replace recursion.

(8) Simulation is the application of _____ data structure.

(9) After evaluating 7 9 3 / 4 1 + * + 2 – postfix expression we get _____.

(10) Best case complexity of Linear Search algorithm is _____.

(11) In _____link-list the address of first node is placed in the address (next) part of the last node.

(12) _____ is a perfectly balanced tree.

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