**Cluster Innovation Centre**
**End Semester Examination – June- 2024**

**Name of the Course: B. Tech (IT and MI)**
**Name of the Paper: Analysis and Design of Algorithms**
**Paper Code:** 3122612402
**Duration: 3 Hrs.** **Semester: IV**
**Maximum Marks:90**

**Instructions to the candidates: Attempt any SIX questions from the all. Question 1 is compulsory.**

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Q. 1 Answer the following questions. 5*3

(a) What are optimal binary search trees? Explain with example.
(b) Explain what is meant by big-O, Θ and Ω time complexities.
(c) Explain N-queens problem with suitable example.

Q. 2 What is Dynamic Programming approach? Explain its features. Solve the matrix chain multiplicationproblem using dynamic programming for given sequence of dimentions {(5x3), (3x7), (7x10), (10x15)}. 15

Q. 3 Solve the following recurrence relations with master method. 7+8

(a) $T(n) = 2T(n/2) + n \log n$
(b) $T(n) = 4T(n/2) + n*n$

Q. 4 Using the greedy approach find the optimal solution to the 0/1 Knapsack problem with 7 objects and max. capacity of knapsack 15 kg, profits on each item as p1, p2..... p7 = {10, 5, 15, 7, 6, 18, 3} and weight of each item as w1, w2.....w7 = {2, 3, 5, 7, 1, 4, 1} respectively. 15

Q. 5 Write short notes on : 16

i) NP-complete problems
ii) Reduction
iii) BFS with example
iv) Tries

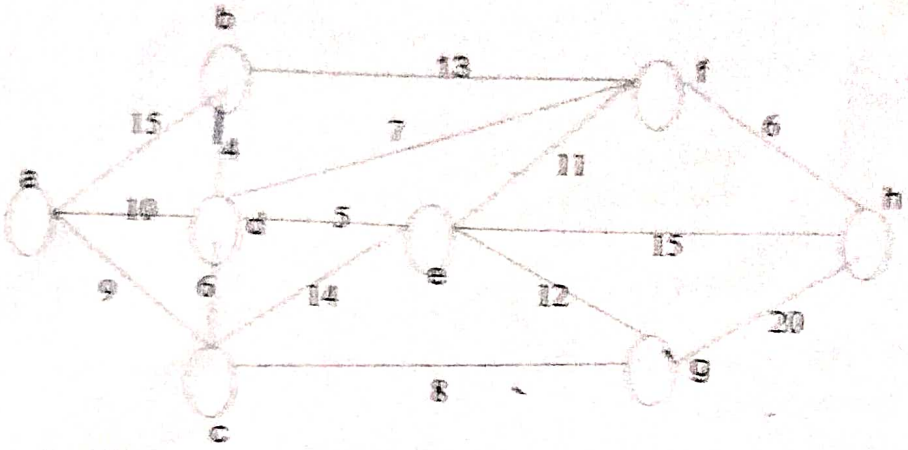
Q. 6 What is an AVL tree? What are its properties? Using the following set of key values build an AVL tree. 14

{11, 18, 6, 12, 14, 28, 21, 37, 50, 3, 2, 55}

Also mention number of rotations performed during its building.

Q.

15




Consider the above given network, generate adjacency matrix, also find the minimum spanning tree using Prim's algorithm. Write the necessary steps involved.