

R18

Code No: 156AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, ECM, CSBS, ITE)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) Compare Apriori analysis and Posterior measurement. [2]
- b) Write the recurrence relation of factorial of a number. [3]
- c) Define bounding function. [2]
- d) What do you mean by Disjoint set? [3]
- e) Define overlapping sub problem. [2]
- f) What do you mean by feasible solution? [3]
- g) Write the time complexity of Prim's and Kruskal's algorithm. [2]
- h) Define Job Scheduling with deadlines. [3]
- i) Give formal definition for traveling salesperson. [2]
- j) What do you mean by reduction in NP Hard? [3]

PART - B

(50 Marks)

2. What is Performance analysis? With neat sketch, explain various asymptotic notations. [10]

OR

3. Find the worst- case and best-case recurrence relation of a quick sort and derive its time complexity using substitution method. [10]
4. List and explain various representations of disjoint sets. Describe following weighted union operations Union (1, 2), Union (3, 4), Union (5, 6), Union (7, 8), Union (1, 3), Union (5, 7) and Union (1, 5). Find (8) using collapsing find algorithm. [10]

OR

5. Find the Sub sets whose sum equals to $m=30$, and $w[1:6]=\{5,10,12,13,15,18\}$ using Backtracking with neat sketch. [10]
6. Design a three-stage system with device types D1, D2, D3. The costs are \$30, \$15, \$20 respectively. The cost of the system is to be not more than \$105 and the reliability of each device type is 0.9, 0.8 and 0.5 respectively. [10]

OR

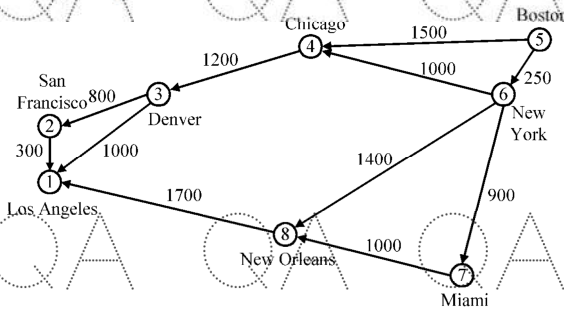
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7. Construct an optimal travelling sales person tour using Dynamic Programming for the given data: [10]

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

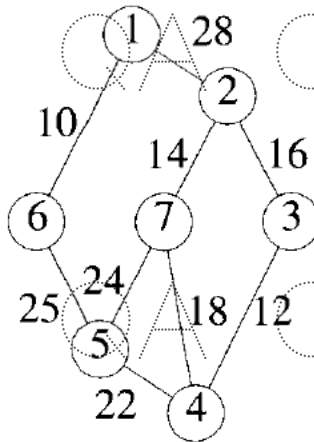
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8. Find the shortest path from Boston to all other cities for the following map using Dijkstra's Algorithm (Graph 1). [10]



Graph 1
OR

9. Find the minimum spanning tree for the following graph 2 using prim's and Kruskal's algorithms. [10]



Graph 2

10. Consider the knapsack instance $n=4$, profits $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$, weights $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$ and capacity of the bag is 15kg. Find the optimal solution for 0/1 knapsack using LCBB and FIFOBB. [10]

OR

- 11.a) What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.
b) Compare and Contrast deterministic algorithm and non-deterministic algorithm. [5+5]

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