

Code: 20CS3403, 20IT3403

II B.Tech - II Semester – Regular Examinations – JULY 2022

DESIGN AND ANALYSIS OF ALGORITHMS

(Common for CSE, IT)

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Write an Algorithm using recursion that determines the LCM of two numbers. Determine the time and space complexity. 7 M
- b) Explain in detail about Travelling Salesman Problem using exhaustive search. 7 M

OR

2. a) Explain Brute Force Technique with an example. 7 M
- b) Show that the average time complexity of QUICK Sort is $O(n \log n)$. 7 M

UNIT – II

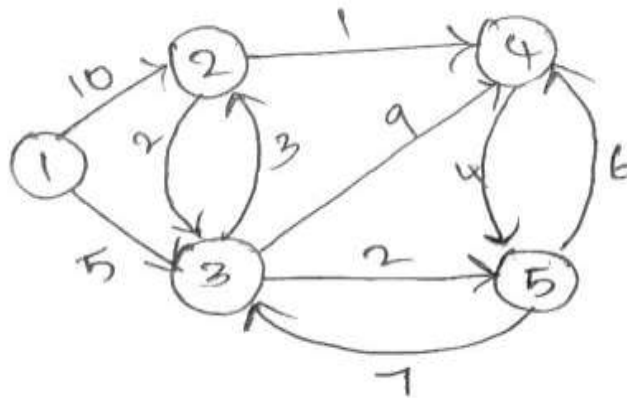
3. a) Write an algorithm to Recursive Binary search. 7 M
- b) Derive the time complexity of Strassens's matrix multiplication. 7 M

OR

4. a) Write an algorithm to Max-Min. 7 M
- b) Apply merge sort algorithm for tracing the following set of numbers: 9,10,11,3,4,12,6,18. 7 M

UNIT-III

5. a) Let $n=5$, $(p_1, \dots, p_5) = (20, 15, 10, 5, 1)$ and $(d_1, \dots, d_5) = (2, 2, 1, 3, 3)$. Find the Optimal Solution for given Job Sequence with Deadlines problem using Greedy method. 7 M
- b) Find the single source shortest path using Dijkstra's algorithm for the given graph.



7 M

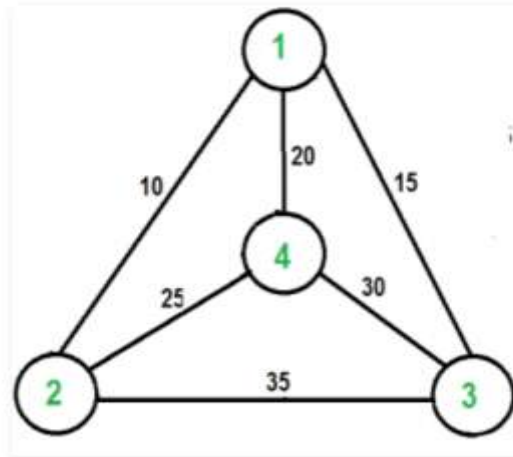
OR

6. a) Explain Kruskal's algorithm with an example. 7 M
- b) Write down the steps to build Huffman tree and explain with an example. 7 M

UNIT – IV

7. a) Consider the problem in which $n = 4$, weights and profits are $\{w_1, w_2, w_3, w_4\} = \{3, 4, 6, 5\}$, $\{p_1, p_2, p_3, p_4\} = \{2, 3, 1, 4\}$. Solve this problem using dynamic programming to find optimal solution. 7 M

- b) Find an optimal solution to Traveling Salesman Problem (TSP) using dynamic programming.



7 M

OR

8. a) Write an algorithm to All Pairs Shortest Path problem. 7 M
- b) Analyze the knapsack instance where $n=3$, $(w_1, w_2, w_3) = (2, 3, 4)$ and $(P_1, P_2, P_3) = (1, 2, 5)$ and $M = 6$. Find optimal solution using set representation method using dynamic programming strategy. 7 M

UNIT – V

9. Consider given by matrix, find optimal path using travelling sales person problem using Branch and Bound method.

$$\begin{pmatrix} \infty & 10 & 15 & 20 \\ 5 & \infty & 9 & 10 \\ 6 & 13 & \infty & 12 \\ 8 & 8 & 9 & \infty \end{pmatrix}$$

14 M

OR

10. a) Explain P, NP, NP-Hard and NP complete problems. 7 M
- b) Explain the steps to Travelling Sales Person Problem using Branch and Bound method. 7 M