

Code No.: AI405PC

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**CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS**

II-B.TECH-II-Semester End Examinations (Regular) - August- 2023

DESIGN ANALYSIS OF ALGORITHMS

(CSM)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Define Space complexity of an Algorithm? [2M]
- b) Write the concept of divide and conquer? [2M]
- c) What is an algorithm write its characteristics? [2M]
- d) What is a graph coloring problem? [2M]
- e) List the advantages of dynamic programming. [2M]
- f) State the travelling salesman problem. [2M]
- g) Define spanning tree and minimum spanning tree. [2M]
- h) Write an algorithm of Greedy Knapsack problem? [2M]
- i) Write the concept of LC branch and bound. [2M]
- j) Mention different types of applications for Branch and Bound. [2M]

PART-B

(50 Marks)

2. Explain the performance analysis of an algorithm in terms of time and space complexity by a suitable example. [10M]

OR

- 3.a) Explain. Binary Search Algorithm using divide and conquer. [5M]
- b) Apply Binary Search on a list of elements to find the key element using divide and conquer. [5M]
- 4.a) Let $m=31$, $w=\{7,11,13,24\}$ draw a portion of space tree using algorithm sum of subset. [7M]
- b) Write short notes on Graphing coloring problem. [3M]

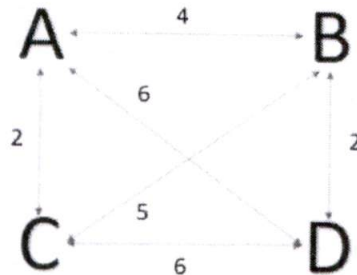
OR

- 5.a) Explain n queen problem where $n=4$. [5M]
- b) Discuss about Union and Find algorithms. [5M]

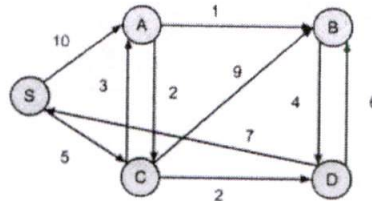
- 6.a) a). Solve the following instance of 0/1 Knapsack problem using Dynamic programming $n=3$, $(W_1, W_2, W_3)=(2, 3, 4)$, $(P_1, P_2, P_3) = (1, 2, 5)$, and $m=6$. [7M]
 b) Explain the concept of reliability design. [3M]

OR

7. Solve the following instance of Travelling Sales person problem using Dynamic Programming. [10M]



8. Write Dijkstra's procedure to solve SSSP(Single source shortest paths problem) and solve SSSP problem for following graph (starting at S): [10M]



OR

9. a) Explain single source shortest path problem with example? [5M]
 What is job sequencing with deadlines problem? Let $n=5$, $(p_1, p_2, p_3, p_4, p_5)=(1, 3, 6, 9, 5)$ and $(d_1, d_2, d_3, d_4, d_5)=(3, 1, 1, 2, 2)$.
 b) Find the optimal solution using greedy algorithm. [5M]
10. Explain the computational classes of P, NP, NP-Complete, NP-Hard. Draw the relation among them. [10M]

OR

11. Draw the portion of the state space tree generated by FIFOBB for the knapsack instance: $n=5$, $(P_1, P_2, \dots, P_5) = (12, 10, 5, 9, 3)$, $(w_1, w_2, \dots, w_5)=(3, 5, 2, 5, 3)$ and $M=12$. [10M]
