Code No: **R1632053** **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, August-2021

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A **(14 Marks)**

1. a) Define Big O notation and Theta notation. [2M]
   b) Write Average case and worst case recursive equation for Quick sort. [2M]
   c) State Optimal Merge Patterns Problem statement. [2M]
   d) What is the difference between Kruskal's and Bellman-ford algorithm? [3M]
   e) Define subset sum problem. [3M]
   f) What are the differences between LC and FIFO Branch-and-Bound operation? [2M]

PART –B **(56 Marks)**

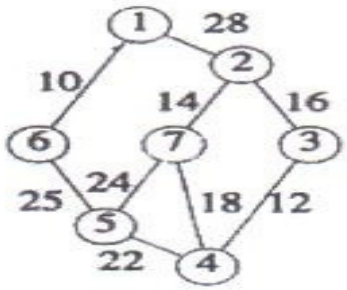
2. a) Solve the following recurrence relation: [7M]

$$T(n) = \begin{cases} a, & \text{if } n = 1 \\ 2T\left(\frac{n}{2}\right) + C_n & \text{if } n > 1 \text{ where } a \text{ and } c \text{ are constants.} \end{cases}$$

   b) Define Time and Space Complexity, and calculate the time space complexity for multiplication of two matrices. [7M]

3. a) Explain with an example, the merge sort technique to sort a set of elements. [7M]
   b) What is the Defective Chessboard problem and give its solution using divide and conquer method? [7M]

4. a) Find the minimum cost spanning tree for the given problem step by step using Kruskal's Algorithms. [7M]



   b) Write greedy algorithm to the job sequencing with deadlines. [7M]

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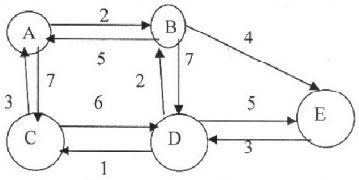
5. a) Find the shortest path between all pairs of nodes in the following graph. [7M]



b) Write an algorithm of minimum edit distance and explain with a suitable example. [7M]

6. a) Explain the Graph – coloring problem. And draw the state space tree for m= 3 colors and n=4 vertices complete graph. [7M]

b) Solve the following instance of sum of subsets problem using backtracking. W = (5, 7, 10, 12, 15); M = 15. [7M]

7. a) Given the following cost matrix, solve the traveling using branch and bound technique? Draw the state space tree. [7M]

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{bmatrix}$$

b) Write general algorithm for branch and bound. [7M]

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