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

III B. Tech II Semester Supplementary Examinations, November-2022

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) What is an algorithm? Mention its properties. [2M]
   b) Give an instance, where the quick sort algorithm has worst case time complexity. [3M]
   c) Write about principle of Optimality. [2M]
   d) Differentiate 'Divide and Conquer' and 'Dynamic Programming' approaches? [2M]
   e) Why Backtracking always produces an optimal solution? Justify. [3M]
   f) What are the searching methods that are commonly used in branch and bound method? [2M]

PART –B (56 Marks)

2. a) Give the algorithm for transpose of a matrix m×n and determine the time complexity of the algorithm by frequency count method. [7M]
   b) List out the Steps in Mathematical Analysis of Recursive Algorithms. [7M]
3. a) Write an algorithm for quick sort based on divide-and-conquer strategy. [7M]
   b) Write an algorithm based on divide-and-conquer strategy to search an element in a given list. Assume that the elements of list are in sorted order. [7M]
4. a) Briefly explain prim's algorithm with an example. [7M]
   b) Solve the following job sequencing with deadlines problem: [7M]
   (D1, D2, D3, D4) = (2, 1, 2, 3) and (P1, P2, P3, P4) = (5, 8, 6, 5)
5. a) Write an algorithm for 0/1 Knapsack problem using Dynamic programming. [7M]
   b) Solve the following string editing problem: [7M]

   X = (x1, x2, x3, x4, x5) = (a, a, b, a, b)

   Y = (y1, y2, y3, y4) = (b, a, b, b).

   The cost associated with each insertion and deletion is 1 and the cost of changing any symbol is 2.
6. a) Explain the process of finding sum of subsets with the following example: Consider an instance of the problem W [1, 2, 3, 4] = [3, 4, 5, 6] and W = 13. [7M]
   b) Explain the Graph–coloring problem. And draw the state space tree for m = 3 colors n = 4 vertices graph. Discuss the time and space complexity. [7M]
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7. a) Give the 0/1 Knapsack LCBB algorithm. Explain how to find optimal solution using variable – tuple sized approach? [7M]

   b) Solve the following Traveling salesperson problem by using LCBB? [7M]

$$\begin{pmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{pmatrix}$$

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