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

**III B. Tech II Semester Supplementary Examinations, February-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) Define the term: Time Complexity. [2M]
   b) Write the abstract Divide and Conquer algorithm. [2M]
   c) State the Job-Sequencing with Deadline Problem. [2M]
   d) State the Purge Rule in 0/1 Knapsack problem using Dynamic Programming. [3M]
   e) Draw the state-space tree along with answer nodes for 4-queens problem. [3M]
   f) Define LC-Search. [2M]

**PART –B** **(56 Marks)**

2. a) Write different pseudo code conventions used to represent an algorithm. [7M]
   b) What do you mean by performance analysis? Give the algorithm for matrix multiplication and find the time complexity using step–count method. [7M]

3. a) Write a recursive algorithm for binary search and also bring out its efficiency. [7M]
   b) Apply Merge Sort to sort the list $a[1,10] = (31,28,17,65,35,42.,86,25,45,52)$. Draw the tree of recursive calls of merge sort functions. [7M]

4. a) Use the greedy algorithm for sequencing unit time jobs with deadlines and profits to generate the solution when $n = 7$, [7M]

$$(p1, p2, \ldots p7) = (3, 5, 20, 18, 1, 6, 30),$$

and

$$(d1, d2, \ldots, d7) = (1, 3, 4, 3, 2, 1, 2).$$

   b) What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example. [7M]

5. a) Explain the methodology of Dynamic programming. Mention the applications of Dynamic programming. [7M]
   b) Construct an optimal travelling sales person tour using Dynamic Programming forthe given data: [7M]

$$\begin{bmatrix} 0 & 10 & 9 & 3 \\ 5 & 0 & 6 & 2 \\ 9 & 6 & 0 & 7 \\ 7 & 3 & 5 & 0 \end{bmatrix}$$
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6. a) Write control abstraction for backtracking. Explain with an example. [7M]
   b) What are the applications of graph coloring? Explain in detail. [7M]

7. a) Distinguish between backtracking and branch – and bound techniques. [7M]
   b) Generate FIFO branch and bound solution for the given knapsack problem, m = 15, n = 3, $(P_1, P_2, P_3) = (10, 6, 8)$ and $(w_1, w_2, w_3) = (10, 12, 3)$. [7M]

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