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

III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020

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**

~~~~~~

PART –A (14 Marks)

1. a) Define the terms: i) Time Complexity ii) Space Complexity. [2M]
   b) Define the Divide and Conquer Strategy. [2M]
   c) Write Control Abstraction of Greedy method. [2M]
   d) Give the statement of the Reliability design problem. [3M]
   e) Define: i) State-Space tree ii) E – Node and iii) Dead Node. [3M]
   f) Define: i) LC – Search ii) Branch and Bound (BB). [2M]

PART –B (56 Marks)

2. a) What are the different mathematical notations used for algorithm analysis? Explain them. [7M]
   b) Give the algorithm for transpose of a matrix of size *m*x*n* and determine the time complexity of the algorithm by frequency – count method. [7M]

3. a) Explain the Recursive Binary search algorithm with suitable examples. [7M]
   b) Derive the time complexity of the Quicksort algorithm for the worst case. [7M]

4. a) Find an optimal solution to the knapsack instance n=7 objects and the capacity of knapsack m=15. The profits and weights of the objects are (P1,P2,P3,P4,P5,P6, P7)=(10,5,15,7,6,18,3), (W1,W2,W3,W4,W5,W6,W7)=(2,3,5,7,1,4,1) respectively. [7M]
   b) Discuss the single-source shortest paths algorithm with a suitable example. [7M]

5. a) Construct an optimal travelling sales person tour using Dynamic Programming for the given data: [7M]

$$\begin{pmatrix} 0 & 10 & 9 & 3 \\ 5 & 0 & 6 & 2 \\ 9 & 6 & 0 & 7 \\ 7 & 3 & 5 & 0 \end{pmatrix}$$

   b) Discuss the time and space complexity of Dynamic Programming traveling sales person algorithm. [7M]

6. a) Write control abstraction for backtracking. [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]

7. a) Write Control Abstraction of Least–Cost(LC) Search. [7M]
   b) Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for n=4, m=15, (p1,p2,p3,p4)=(10,10,12,18), (w1,w2,w3,w4) =(2, 4, 6, 9). Draw the portion of the state space tree and find optimal solution. [7M]

*****
~~~~~~