Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (INFORMATION TECHNOLOGY)
MAKEUP EXAMINATIONS, DECEMBER 2018
SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS [ICT 3107]
REVISED CREDIT SYSTEM
(21 /12/2018)

Time: 3 Hours (Scheme of Evaluation) MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

1A. Write a function for inserting an element into sorted array and find it's time complexity using step count method. **5**

1B. Write an approximation algorithm for vertex cover problem and calculate the time complexity of the algorithm. **3**

1C. Define:
i. Big Oh Notation
ii. Omega Notation **2**

2A. Solve the following matrix multiplication chain problem.
M=4, r = [10, 100, 5, 50, 1] **5**

2B. Compare and contrast Binary search and Linear search methods. **3**

2C. Analyze the time complexity of Strassen's Matrix multiplication problem. **2**

3A. Construct an AVL tree for the data given below:
10, 5, 11, 6, 15, 17, 19, 40, 8, 9, 20, 21, 30, 35, 50 **5**

3B. Construct a hash table for a data given below using double hashing technique.
Hash table size = 10, R = 3
Data: 10, 40, 30, 90, 120, 150, 900, 300, 600, 70 **3**

3C. Explain NP-hard and NP-complete problems. Give suitable examples. **2**

4A. Clearly mention all the steps in solving Floyds' algorithm for the graph given in Fig. Q.4A. and analyze the time complexity. **5**

1A, 1B, 1C, 2A, 2B, 2C, 3A : Dr. Ajitha Shenoy A.S.
3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C : Mrs. Diana D'Souza

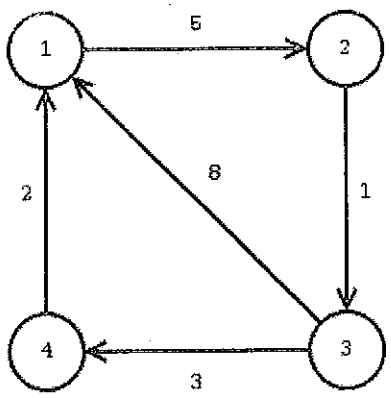

Fig. Q.4A

4B. Compare and contrast the Adjacency matrix and Linked List Graph representations. 3

4C. Write an algorithm to find the optimal solution for the fractional knapsack problem (i.e, part of the item can be loaded into the sack) using greedy technique. 2

5A. Write an efficient program to find the Maxclique in a given graph. Analyze the time complexity for the same. 5

5B. Given an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes single unit of time, so the minimum possible deadline for any job is 1. Apply greedy technique to maximize total profit if only one job can be scheduled at a time.

Input: Five Jobs with following deadlines and profits.

JobID	Deadline	Profit
a	2	100
b	1	19
c	2	27
d	1	25
e	3	15

3

5C. Write an algorithm to find the Minimum Cost Spanning trees of a graph G= (V, E). 2