MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

V SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

MAKE UP EXAMINATIONS, DEC 2016

SUBJECT: FUNDAMENTALS OF ALGORITHM ANALYSIS AND DESIGN (ICT 3151)

(REVISED CREDIT SYSTEM)

(27/12/2016)

TIME: 3 HOURS   **MAX. MARKS: 50**

> **Instructions to candidates:**
> - Answer **ALL** the questions
> - Missing data may be suitably assumed.

1A. Find MaxClique for the graph given in Figure Q.1A using Backtracking algorithm.   5

1B. Consider 3 items with profits [25,24,15], weights [18,15,10] and capacity of the knapsack as 30. Find the optimal packing of knapsack using Greedy technique with all the possible greedy criteria.   3

1C. What is the Principle of optimality? Explain with an example.   2

2A. Find all pairs shortest paths for the graph given in Figure Q.2A using Dynamic programming technique.   5

2B. Perform average case time complexity analysis for Quick Sort.   3

2C. Compare Backtracking and Branch and Bound algorithm design techniques.   2

3A. Find the optimal tour for traveling salesperson using Branch and Bound technique for the graph shown in Figure Q.3A.   5

3B. Define Asymptotic notations O, Ω, θ and prove that $\frac{1}{2}n(n-1) \in \theta(n^2)$ 3

3C. What is P and NP-complete problems.

4A. Write Kruskal's and Prim's algorithms. Also specify Greedy criteria used.   5

4B. Using component labeling algorithm find the components in the graph given in Figure Q.4B.   3

4C. Arrange the following functions in the increasing order of growth.   2

i)log(n!)   ii)n log n   iii) $\sqrt{log}$ n   iv)(log n)!

5A. Using the Divide and Conquer strategy, write an algorithm for finding the closest pair of n given points. Analyse the time complexity of the same.   5

5B. Write a recursive algorithm for sequential search. Find the space and time complexity for the same. 3

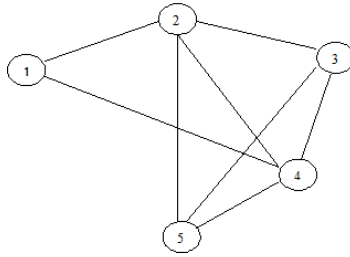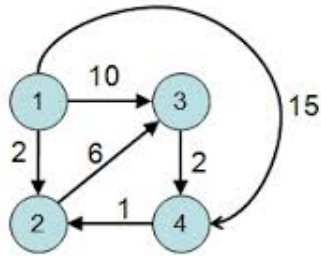**5C.** Represent undirected weighted graph using an Abstract Data Type. 2
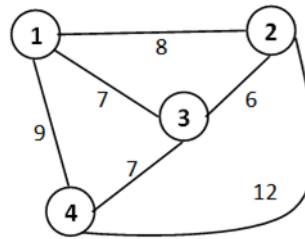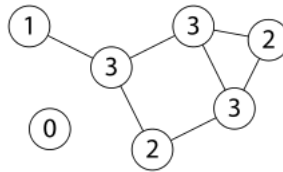

Figure Q.1A

Figure Q.2A

Figure Q.3A

Figure Q.4B