DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
SECOND SESSIONAL
SUBJECT: (IT 509) Design And Analysis of Algorithm

Examination	**: B.TECH Semester - V**	**Seat No.**	**:**
Date	**: 10/09/2016**	**Day**	**: Saturday**
Time	**: 12:45 – 02:00**	**Max. Marks**	**: 36**

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume any necessary data but giving proper justifications.
4. Be precise, clear and to the point in answering the questions. Unnecessary elaborations will not fetch more marks.

Q.1 Do as directed. **[12]**

(a) What is the key difference between Divide and Conquer and Dynamic Programming paradigm? **[1]**

(b) Compare greedy technique with dynamic programming. Why dynamic programming always gives an optimal solution to the problem when greedy is fail for the same problem? **[2]**

(c) Suppose that in a 0-1 knapsack problem, the order of the items when sorted by increasing weight is the same as their order when sorted by decreasing profit. Give an efficient algorithm to find an optimal solution to this variant of the knapsack problem, and argue that your algorithm is correct.[Hint: greedy-type algorithm] **[2]**

(d) Is it possible to solve single-source longest path problem using dijkstra's algorithm by changing minimum to maximum? Yes or No with proper justification and counterexample. **[3]**

(e) Prove the optimal substructure property of shortest path problem using proof by contradiction method. [Hint: proof by cut-paste] **[3]**

(f) Explain Overlapping Subproblem property. **[1]**

Q.2 Attempt ***Any TWO*** of the following questions. **[12]**

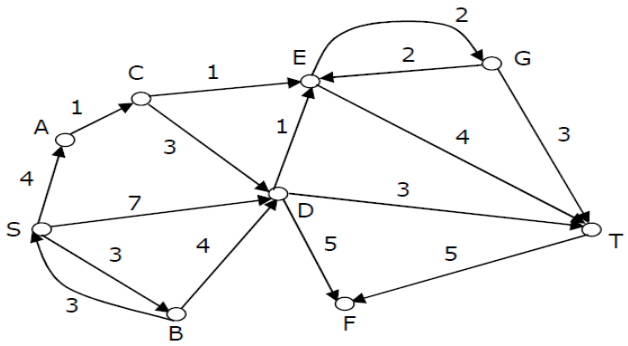
(a) Explain the Greedy technique template in detail with required definition of feasible solution, optimal solution, candidate-set, solution-set etc. **[6]**

(b) Suppose we want to solve the Maximum Spanning Tree problem. Depict the kruskal's algorithm for finding Maximum Spanning Tree of a given graph, analyze its time complexity with appropriate reasoning. **[6]**

(c) Describe the fractional knapsack problem setup with different greedy strategy, write the algorithm for optimal greedy strategy and analyze its time complexity. **[6]**

Q.3 (a) Write 0/1 knapsack algorithm using dynamic programming and analyze its time as well as space complexity. **[6]**

(b) Find the single source shortest path using Dijkstra's algorithm from source node 'S' to all other nodes in the given graph below and draw a final shortest path tree, **[6]**



OR

Q.3 (a) Depict the Prim's algorithm for finding Minimum Spanning Tree of a given graph, analyze its time complexity with appropriate reasoning. **[6]**

(b) Solve using 0/1 knapsack algorithm of dynamic programming, Knapsack capacity W = 11, Profits (p_1,p_2,p_3,p_4,p_5) = (1,6,18,22,28), Weights (w_1,w_2,w_3,w_4,w_5) = (1,2,5,6,7) of items respectively find the maximum profit and final selected item set which provide maximum profit. **[6]**