



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 : 08/09/2017	Day : Friday	
Time : 11:30 to 12:45	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 suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

- (a) In which case the execution time of Dynamic Programming is better than Divide and Conquer. [2]
Explain with example
- (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) Discuss Optimization Problem with all necessary constitutes. Also, state why Optimization Problems are difficult to solve compare to conventional problems. [2]
- (d) Classify the following methods according to selection function they use(either Ordering Or Subset Selection) Knapsack Problem, Minimum Cost Tour. Justify your answer [2]
- (e) In a weighted undirected tree $G = (V, E, w)$, breadth-first search from a vertex s finds single-source shortest paths from s (via parent pointers) in $O(V + E)$ time. State true or false with justification [2]
- (f) State and Explain the principle of optimality (or optimal substructure property) with suitable example [2]

Q.2 Attempt *Any TWO* of the following questions.

[12]

- (a) Write a dynamic programming based solution to job selection problem where there are n number of jobs each with a profit p_i and processing time t_i . The objective is to select k out of n jobs in such a way that the total profit is maximized but total processing time does not exceed t_{max} . (please note that the partial job does not earn any profit)
- (b) Describe the fractional knapsack problem setup with different greedy strategy, write an algorithm for optimal greedy strategy and analyze its time complexity.
- (c) Consider the graph in Figure 1 and find the all pair shortest path using Floyd's algorithm [Marks will be awarded for clear and step by step explanation only]

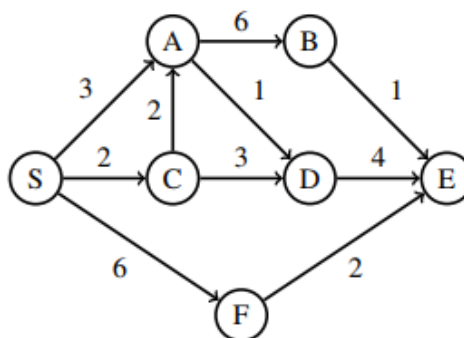


Figure 1. Graph for the Problems in Question 2(c) and 3(a)

- Q.3**
- (a) Consider the Graph in Figure 1 and compute minimum spanning tree using kruskal's algorithm [8]
[Marks will be awarded for clear and step by step explanation only]
 - (b) What changes are needed to find not only the cost but also the value of the shortest path in Dijkstra's algorithm [4]

OR

- Q.3**
- (a) Consider the Graph in Figure 1 and compute the single source shortest path (starting from node S) using Dijkstra's algorithm [Marks will be awarded for clear and step by step explanation only] [8]
 - (b) Explain the dynamic programming based solution to binomial coefficient problem [4]