Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Sem. - V - Examination – June- 2011

Subject code: 150703

Subject Name: Design and Analysis of Algorithms

Date:24/06/2011 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain different asymptotic notations in brief. **06**

(b) Explain the terms: (Give example wherever necessary) **08**

i) Quantifiers
ii) Articulation Point
iii) Preconditioning
iv) Optimal Substructure property

Q.2 **(a)** i) Explain how multiplication of large integers can be done efficiently by using divide and conquer technique? **04**

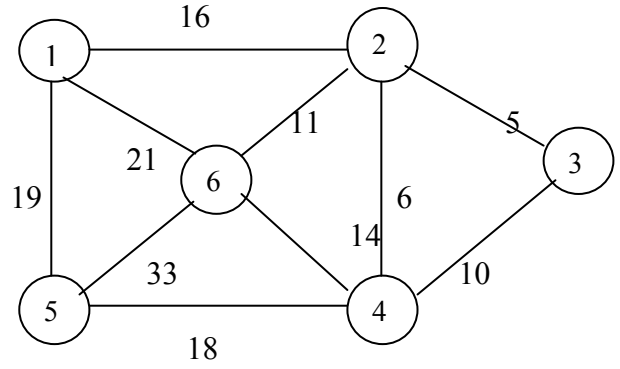
ii) Explain in brief characteristics of greedy algorithms **03**

(b) Design and analyze quick sort algorithm using divide and conquer technique. **07**

OR

(b) What is an amortized analysis? Explain aggregate method of amortized analysis using suitable example. **07**

Q.3 **(a)** Consider the following undirected weighted graph. Find minimum spanning tree for the same using Kruskal's algorithm. **04**



(b) What is a fractional knapsack problem? Design and analyze greedy algorithm to solve it. **05**

(c) What is Finite Automata? How it can be used in string matching **05**

OR

Q.3 **(a)** Write and analyze Prim's algorithm to generate minimum spanning tree **04**

(b) Design and explain Dijkstra's shortest path algorithm. **05**

(c) Explain Rabin-Carp string matching algorithm with example **05**

Q.4 **(a)** Consider the chain of matrices A1,A2,..,A6 with the dimensions given below. Give the optimal parenthesization to get the product A2..A5 **04**

Matrix	Dimension
A1	30 X 35
A2	35 X 15
A3	15 X 5
A4	5 X 10
A5	10 X 20
A6	20 X 25

(b) Describe an assembly line scheduling problem and give dynamic programming algorithm to solve it. **06**

(c) Describe LCS problem with example and obtain optimal substructure required to solve it using dynamic programming. **04**

OR

Q.4 **(a)** Design and analyze dynamic programming algorithm with and without memoization to solve matrix chain multiplication problem **08**

(b) Give optimal substructure for make change problem. Consider an instance of such a problem with coins 1, 4 and 6 units. Illustrate its solutions using dynamic programming approach involving a payment of 8 units or less. **06**

Q.5 **(a)** Explain with example how games can be formulated using graphs? **04**

(b) Discuss how 8-queen problem can be solved using backtracking. **04**

(c) What is polynomially turing reducible problem? Explain with example how problem A can be polynomially Turing reduced to problem B. **06**

OR

Q.5 **(a)** Construct an implicit tree for 0-1 Knapsack problem. Give backtracking algorithm to solve it. **06**

(b) Write down the algorithm to determine articulation points in a given undirected graph. Give any application where it is applicable. **04**

(c) Define P, NP, NP complete and NP-Hard problems. **04**

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