Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Vth Semester–Examination – Nov-Dec- 2011

Subject code: 150703

Subject Name: Design and Analysis of Algorithm

Date:26/11/2011 **Time: 02:30 pm – 05:00 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)** Answer the following **07**

(i) What is relation? Explain equivalence relation.

(ii) Explain linear inequality and equations.

(b) Answer the following **07**

(i) Explain asymptotic analysis of algorithm.

(ii) Let $f(n)$ and $g(n)$ be asymptotically positive functions. Prove or disprove following.

$f(n) + g(n) = \Theta(\min(f(n), g(n)))$.

Q.2 **(a)** Write selection sort algorithm. And compute running time of algorithm. **07**

(b) Answer the following **07**

(i) Prove that $(n + a)^b = \Theta(n^b)$, $b>0$

(ii) Find big oh(O) notation for following:

(1) $f(n) = 6993$ (2) $f(n) = 6n^2 + 135$

OR

(b) Answer the following **07**

(i) Find big theta(Θ) and big omega(Ω) notation.

(1) $f(n) = 14 * 7 + 83$. (2) $f(n) = 83n^3 + 84n$

(ii) Is $2^{n+1} = O(2^n)$? Explain.

Q.3 **(a)** Explain Binary search using divide and conquer method and compute its worst case running time. **07**

(b) Answer the following **07**

(i) Explain how divide and conquer method help multiplying two large integers.

(ii) Explain common characteristics of dynamic programming.

OR

Q.3 **(a)** Explain Quick sort using divide and conquer method and computer it's worst case running time. **07**

(b) Answer the following **07**

(i) Explain how divide and conquer method help multiplying two square matrices.

(ii) Explain difference between divide and conquer method and dynamic programming.

Q.4 **(a)** Using algorithm find an optimal parenthesization of a matrix chain product whose sequence of dimension is (5,10,3,12,5,50,6) (use dynamic programming). **07**

(b) Using greedy algorithm find an optimal solution for knapsack instance n=7, M = 15 $(P_1,P_2,P_3,P_4,P_5,P_6,P_7)$=(10,5,15,7,6,18,3) and $(w_1,w_2,w_3,w_4,w_5,w_6,w_7)$ = (2,3,5,7,1,4,1) **07**

OR

Q.4 **(a)** Using algorithm determine an Longest Common Sequence of (A,B,C,D,B,A,C,D,F) and (C,B,A,F)(use dynamic programming). **07**

(b) Using greedy algorithm find an optimal schedule for following jobs with n=7 profits: $(P_1,P_2,P_3,P_4,P_5,P_6,P_7)$ = (3,5,18,20,6,1,38) and deadline $(d_1,d_2,d_3,d_4,d_5,d_6,d_7)$ = (1,3,3,4,1,2,1) **07**

Q.5 **(a)** Answer the following **07**

(i) Explain Rabin Karp string matching algorithm.

(ii) Explain different class of problems.

(b) Answer the following **07**

(i) Generate minimum spanning tree of fig, A using Prim's algorithm.

(ii) Find all possible solution for the 4*4 chessboard, 4 queen's problem using backtracking.

OR

Q.5 **(a)** Answer the following **07**

(i) Explain string matching with finite automata.

(ii) Explain polynomial reduction.

(b) Answer the following **07**

(i) Generate minimum spanning tree of fig, A using Kruskal's algorithm.

(ii) Explain with example how backtracking algorithm useful in solving Hamiltonian cycle problem.

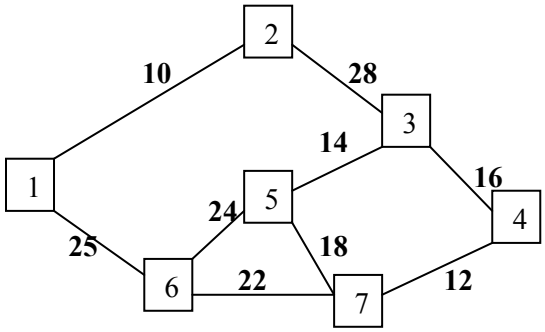

Fig: A

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