Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. .....

CS/IT–404(N)

B. E. (Fourth Semester) EXAMINATION, June, 2010

(New Scheme)

(Common for CS & IT Engg.)

ANALYSIS AND DESIGN OF ALGORITHMS

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. Assume suitable data wherever necessary.

Unit–I

1. (a) Solve the recurrence. $T(n) = 2T(\sqrt{n}) + 1$ by making a change of variables. 5

   (b) What is the running time of quick sort algorithm when all elements of array A have the same value ? 5

   (c) Explain Strassen's matrix multiplication algorithm. 10

Or

2. (a) Sort the following array using heap-sort techniques : 10

   (5, 8, 3, 9, 2, 10, 1, 45, 32)

   (b) Explain divide and conquer technique. 5

   (c) Show that an *n*-element heap has height [log n]. 5

P. T. O.

Unit – II

3. (a) Find the optimal schedule for the following jobs with n = 7 profits : 10

$(P_1, P_2, \ldots\ldots P_7) = (3, 5, 18, 20, 6, 1, 38)$

and deadlines $(d_1, d_2, d_3 \ldots\ldots d_7) = (1, 3, 3, 4, 1, 2, 1)$

(b) Explain Greedy algorithm for constructing a Huffman code. 10

Or

4. (a) Show how to solve fractional knapsack problem in θ (n) time. 10

(b) Explain Prim's algorithm. 10

Unit – III

5. (a) What is dynamic programming ? Discuss the elements of dynamic programming. How does the dynamic programming differ from Greedy algorithm ? 10

(b) Find the shortest path using Floyd Warshall algorithm 10

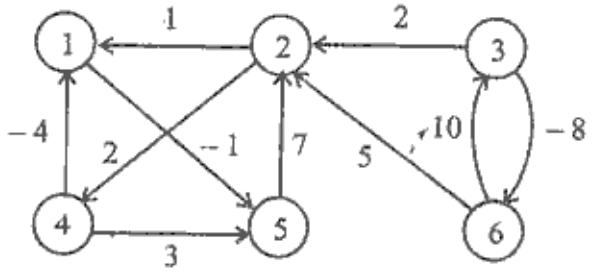

Fig. 1

Or

6. (a) Define how knapsack problem is solved by dynamic programming. Consider $n = 3$ $(w_1\, w_2\, w_3) = (2, 3, 3)$, $(P_1\, P_2\, P_3) = (1, 2, 4)$ and m = 6. Find optimal solution. 10

(b) Solve the given multistage graph. 10

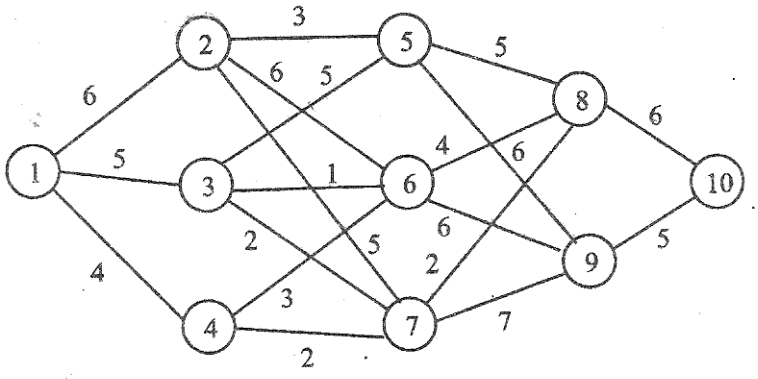

Fig. 2

Unit – IV

7. (a) Explain and solve 4 queen's problem using Backtracking. 10

(b) Explain lower bound theory and its use in solving algebraic problem. 10

Or

8. (a) What is Hamiltonian cycle ? Write an algorithm to find all Hamiltonian cycles is a graph. 10

(b) Explain CRCW and EREW algorithms. 10

Unit – V

9. (a) Create a B-Tree of order 5 from the following list of data items : 12

30, 20, 35, 95, 15, 60, 55, 25, 5, 65, 70, 10, 40, 50, 80, 45

(b) Explain Np-complete and Np-hard problem. 8

Or

10. (a) In what way is an AVL tree is better than a Binary tree. Insert these keys in to an AVL free : 10

342, 206, 444, 523, 607, 301, 142, 183, 102, 157, 149.