

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 $\lceil \log n \rceil$. 5

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Unit – II

3. (a) Find the optimal schedule for the following jobs with $n = 7$ profits : 10
 $(P_1, P_2, \dots, P_7) = (3, 5, 18, 20, 6, 1, 38)$
 and deadlines $(d_1, d_2, d_3, \dots, d_7) = (1, 3, 3, 4, 1, 2, 1)$
- (b) Explain Greedy algorithm for constructing a Huffman code. 10

Or

4. (a) Show how to solve fractional knapsack problem in $\theta(n)$ 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

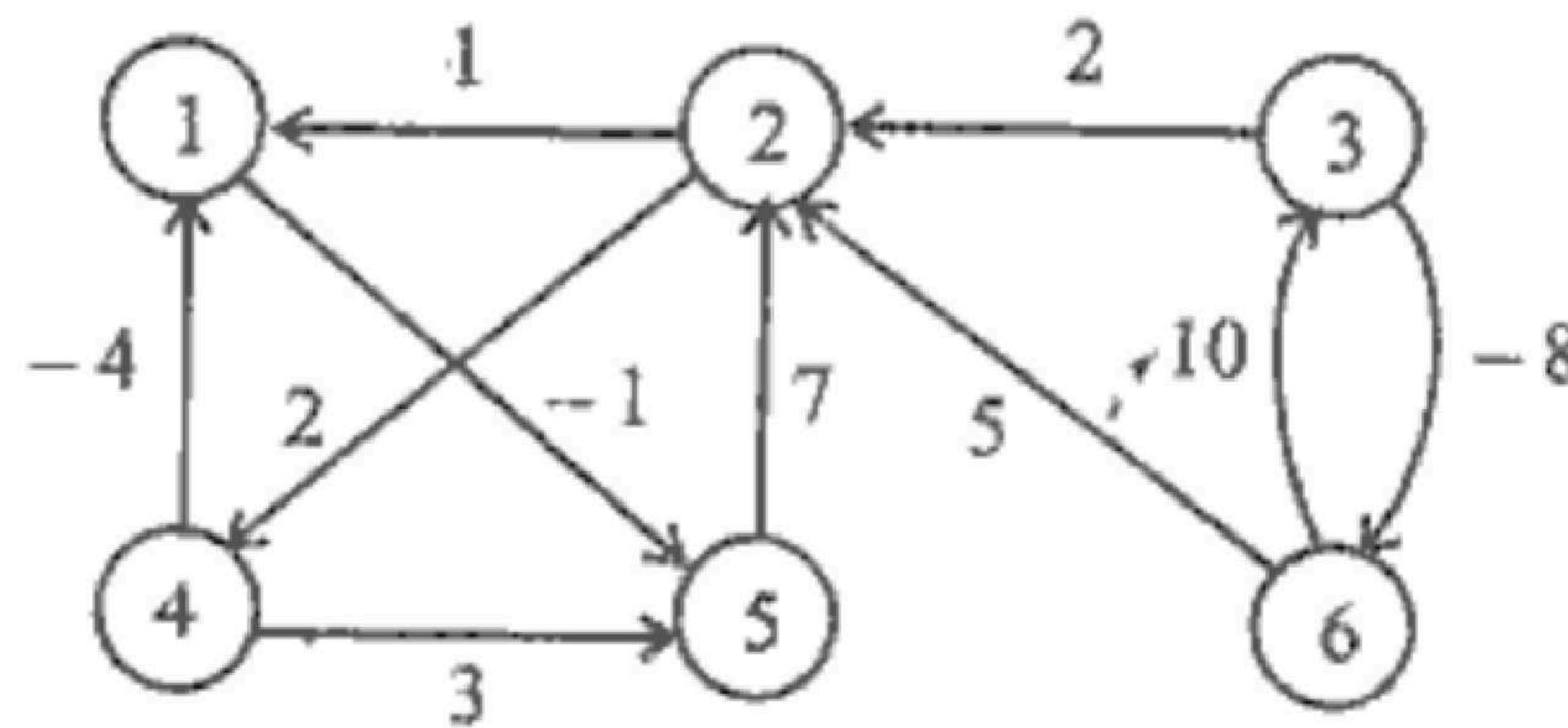


Fig. 1

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

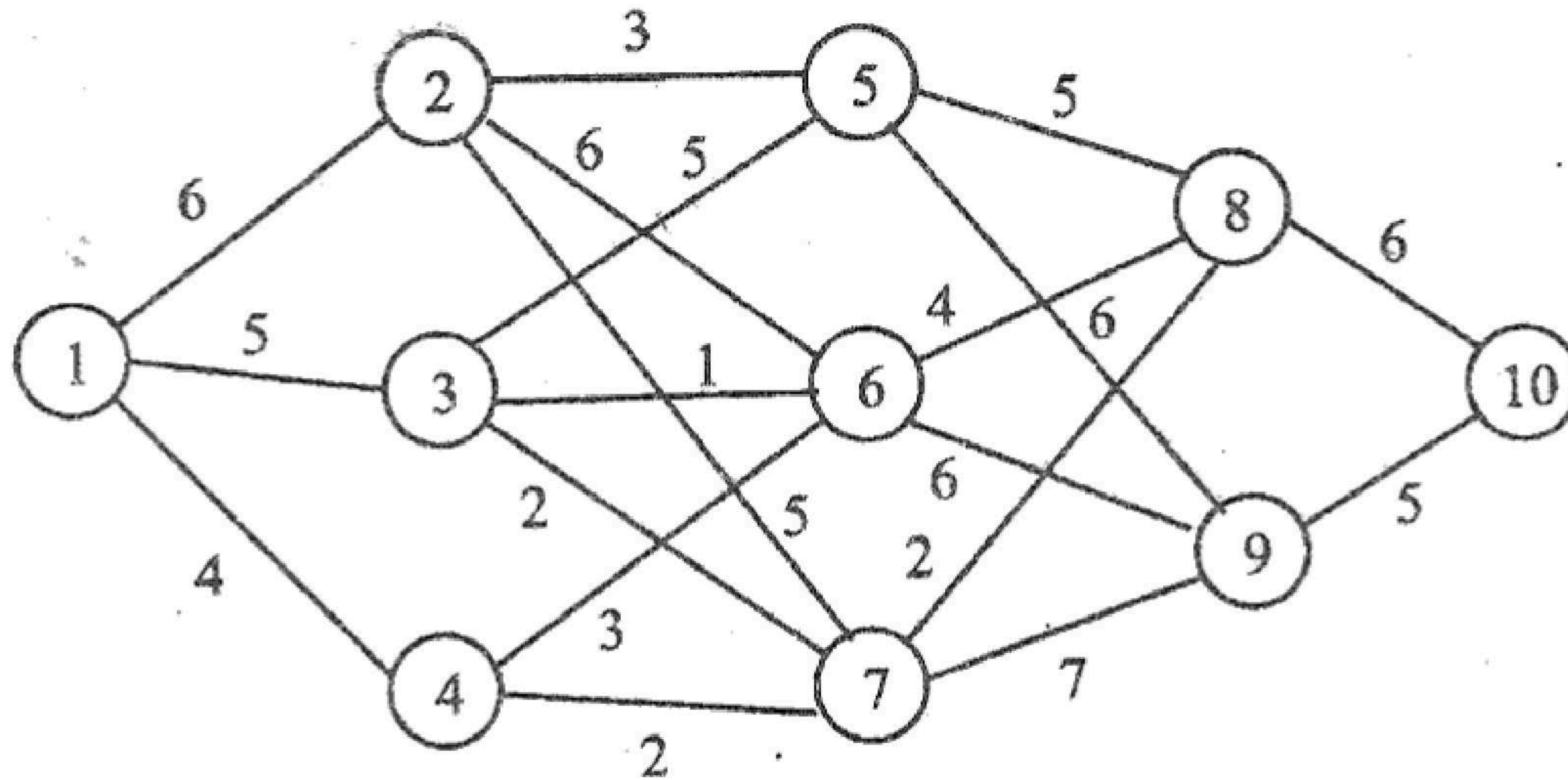


Fig. 2

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 in 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 better than a Binary tree. 10
 Insert these keys in to an AVL tree :
 342, 206, 444, 523, 607, 301, 142, 183, 102, 157, 149.

P. T. O.