

Roll No.

CS/IT-404(N)

B. E. (Fourth Semester) EXAMINATION, Dec., 2009

(New Scheme)

(Common for CS & IT Engg. Branch)

ANALYSIS AND DESIGN OF ALGORITHMS

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *one* question from each Unit. All questions carry equal marks. Assume suitable data wherever necessary.

Unit – I

1. (a) Find the location of 45 in the given array by applying binary search algorithm : 10

9, 12, 15, 24, 30, 36, 45, 70

- (b) What are heaps ? Write a complete algorithm to create a heap. Explain with example. 10

Or

2. (a) What is the significance of Asymptotic Notation ? Draw a graph of a function $\log n$, $n \log n$, n^2 , 2^n for various values of n . 10

- (b) Sort the given list using merge sort : 10

50, 40, 20, 70, 15, 35, 20, 60

P. T. O.

Unit-II

3. (a) Given 10 activities along with their start and finish time as : 10

$$s_i = \langle 1, 2, 3, 4, 7, 8, 9, 9, 11, 12 \rangle$$

$$f_i = \langle 3, 5, 4, 7, 10, 9, 11, 13, 12, 14 \rangle$$

Compute a schedule where largest number of activities takes place.

- (b) Explain the greedy strategy. Write algorithm for knapsack problem. 10

Or

4. (a) Apply Kruskal's algorithm to find a generic minimum spanning tree for the graph : 10

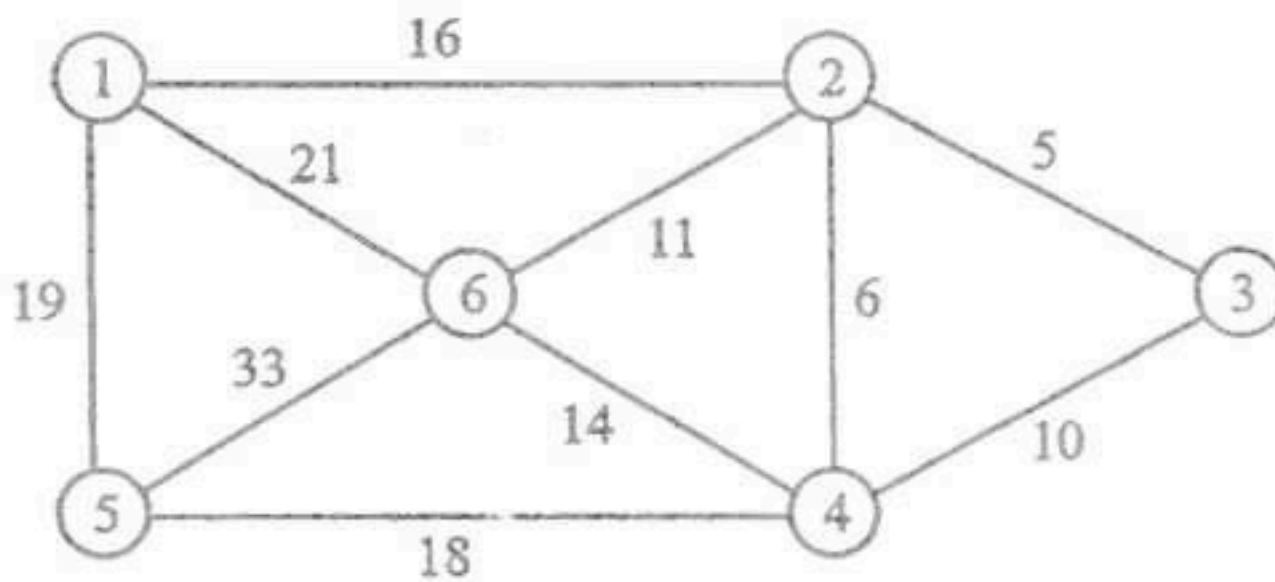


Fig. 1

- (b) Find the optimal merge pattern for the following data : 10

28, 32, 12, 5, 84, 53, 91, 35, 3, 11

Unit-III

5. (a) Define how knapsack problem is solved by using 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 for the given data. 12

- (b) Explain Reliability design problem briefly. 8

Or

6. (a) Apply Floyd-Warshall algorithm for constructing shortest path. Show the matrices $D^{(k)}$ and $\pi^{(k)}$ computed for the graph. 12

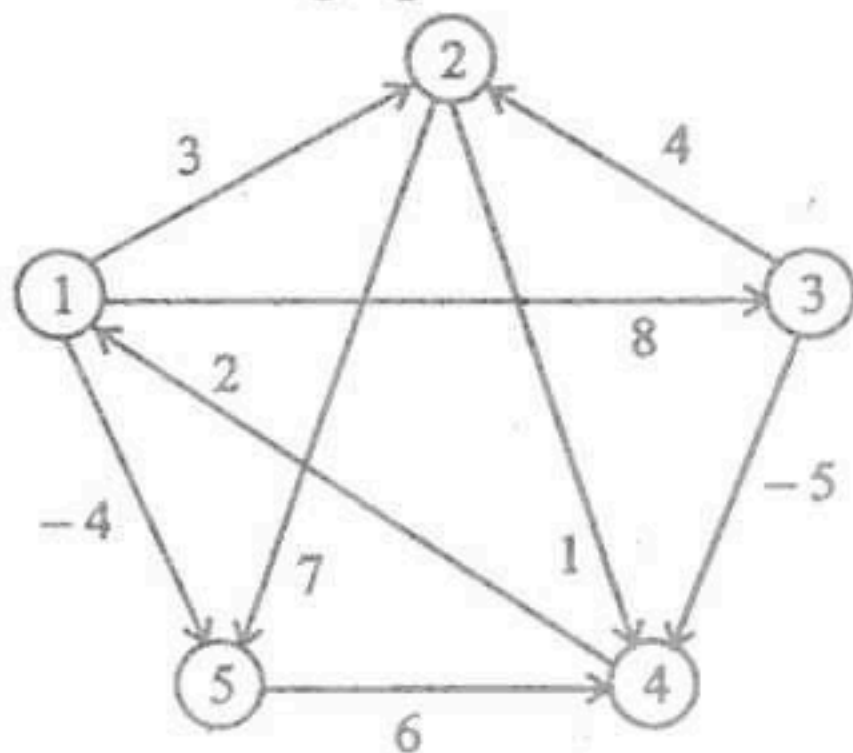


Fig. 2

- (b) Explain dynamic programming with example. 8

Unit – IV

7. (a) Write a backtracking algorithm for 8-queen problem. 10

- (b) Explain travelling salesman problem using branch and bound method. Generate a state space tree for the following cost matrix : 10

$$C_{ij} = \begin{matrix} & \begin{matrix} A & B & C & D \end{matrix} \\ \begin{matrix} A \\ B \\ C \\ D \end{matrix} & \begin{bmatrix} \infty & 12 & 7 & 4 \\ 10 & \infty & 13 & 9 \\ 3 & 8 & \infty & 11 \\ 5 & 6 & 10 & \infty \end{bmatrix} \end{matrix}$$

Or

8. (a) Design a backtracking algorithm for graph-coloring problem. 10
- (b) Explain lower bound theory and its use in solving algebraic problems. 10

P. T. O.

9. (a) Create a B-tree of order 5 from the following lists of data items : 10
< 15, 20, 35, 95, 13, 10, 50, 65, 5, 70, 30, 40, 45, 80, 25, 6, 22, 33 >
(b) Write an algorithm for BFS and DFS. 10

Or

10. (a) Define NP completeness and reducibility of problems. What are NP hard problems ? 10
(b) A binary tree has 9 nodes. The inorder and preorder traversal of tree yield the following sequence of nodes : 10

Inorder : E A C K F H D B G

Preorder : F A E K C D H G B