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 = <1, 2, 3, 4, 7, 8, 9, 9, 11, 12>

f_i = <3, 5, 4, 7, 10, 9, 11, 13, 12, 14>

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

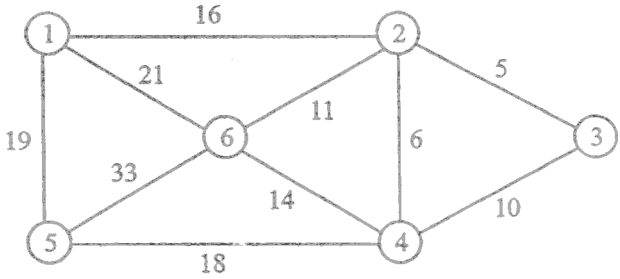

Fig. 1

(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

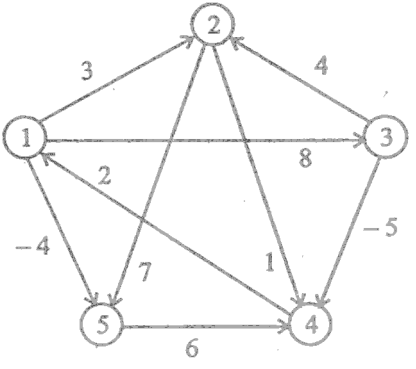

Fig. 2

(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

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

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.

Unit – V

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