CS/IT - 404

B.E. IV Semester

Examination, June 2013

Analysis And Design of Algorithm

Time : Three Hours

Maximum Marks : 70/100

Note: Attempt one question from each unit, including sub parts. All questions carry equal marks.

Unit - I

1. a) Describe the methods of analyzing an algorithm. What do you mean by best case, average case and worst case time complexity of an algorithm.

   b) Explain divide and conquer technique. Design a recursive algorithm for binary search.

OR

2. a) Explain heap sort algorithm with example.

   b) Solve the recurrence relation :

   $T(n) = 3(n|4) + n$

Unit - II

3. a) Obtain a set of optimal Huffman codes for the seven messages (M_1 - - - - - - M_7) with relative frequencies (q_1 - - - - - - q_7) = (4,5,7,8,10,22,15). Draw the decode tree for this set of codes.

   b) Write and explain single source shortest path algorithm with example.

OR

4. a) Consider the Knapsack instance $n = 3$, $(W_1, W_2, W_3) = (2, 3, 4)$ and $(P_1, P_2, P_3) = (1, 2, 5)$ and m = 5. Find the optimal solution.

   b) There are 5 jobs whose profits

   (P_1 - - - - - P_5) = (20,15,10,1,6) and deadlines (2,2,1,3,3). Find the optimal solution that minimizes profit on scheduling these jobs. Discuss its algorithm too.

Unit - III

5. a) Write Floyd-Warshall algorithm to solve all pair shortest path problem. Also write its complexity.

   b) Show that greedy strategy will not work for 0-1 Knapsack problem. Give a dynamic programming based solution for this problem.

OR

6. a) What is multistage graph problem? Discuss its solution based on dynamic programming approach. Give a suitable algorithm and find its computing time?

   b) Explain dynamic programming concept with example.

Unit - IV

7. a) Explain back tracking technique for designing an algorithm.

   b) What is Hamiltonian cycle? Write an algorithm to find all Hamiltonian cycle in graph?

OR

8. a) What is branch and bound technique? How travelling sales person problem can be solved using this technique?

b) What is graph coloring problem? Give algorithm to solve this problem?

Unit - V

9. a) Create a B-tree for the following list of elements :

{86,50,40,3,94,10,70,90,110,113,116}

Given minimization factor $t = 3$, minimum degree = 2 and maximum degree =5

b) Show that the travelling sales man problem is NP - complete.

OR

10. a) Write DFS and BFS algorithms and also analyses the running time of algorithm.

b) Create an AVL tree for the following. List of elements by inserting in empty AVL tree (Write step by step insertion)