BCA – 51

V Semester B.C.A. Examination, Feb./March 2010
ALGORITHMS AND ANALYSIS

Time: 3 Hours Max. Marks : 80

Instructions *: 1) Answer* ***all*** *questions in Part* ***A****,* ***6*** *out of* ***8*** *questions in Part B, and* ***3*** *out of 5 questions in Part C.*
2) Part ***A****: Questions from* ***1*** *to* ***8*** *carry* ***1*** *mark and* ***9*** *to* ***14*** *carry* ***2*** *marks* ***each****.*
3) Part ***B*** *: **Each** question carries* ***5*** *marks.*
4) Part ***C : Each*** *question carries* ***10*** *marks.*

PART – A

1. What is an Algorithm ?
2. What is Recursion ?
3. Mention the different notations used for expressing the time complexity ?
4. What is the time complexity of Binary Search ?
5. What is the maximum height difference between left sub tree and right sub tree of an AVL Tree ?
6. What are the steps involved in Divide and Conquer technique ?
7. Give an example problem for Back Tracking.
8. Define DAG.
9. Differentiate between BFS & DFS algorithms.
10. What do you mean by a Minimum Spanning tree of a graph ?
11. What is the Mode of a given array ? Give an example.
12. How do you represent a graph for processing using a computer ? Give an example.
13. Compare Divide & Conquer technique with Dynamic Programming.
14. What is the use of a State-Space tree ?

P.T.O.

PART – B

1. Write an algorithm to generate N^{th} Fibonacci No.
2. Write an algorithm to find the sum of Two(M x N) matrices.
3. Write an algorithm using Brute Force technique to find a Substring in a given Text string.
4. Find an optimal solution to the given Knapsack problem using

   Brute Force Technique.

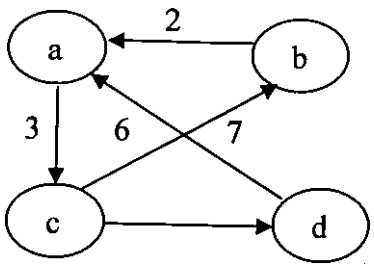
   Knapsack Capacity m = 50, No. of objects n = 4, Weights(w1 = 30, w2 = 12,w3 = 15, w4 = 18) and the respective Profits are (P1 = 40, P2 = 30, P3 = 25, P4 = 45)
5. Give an algorithm to sort a given array using Selection sort. And also find the time complexity of the algorithm.
6. Explain the algorithm for Merge Sort and trace the algorithm for the given example below.

   15 13 10 20 12 5 8 6
7. Construct a heap for the following list of elements using top-down approach and sort them in ascending order

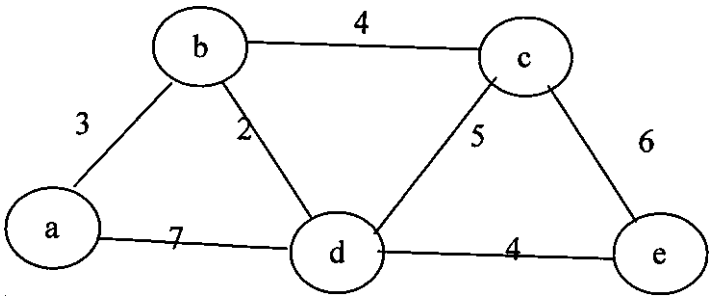
   50 25 30 75 100 45 80
8. Sort the given array of elements
   8 2 4 1 7 9 3

PART – C

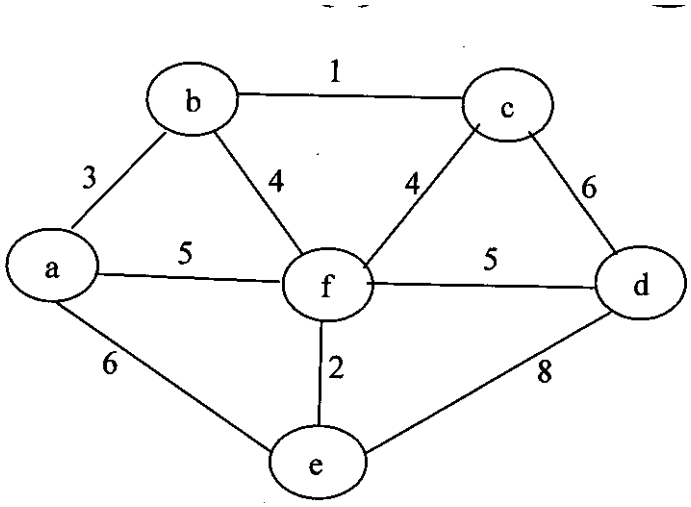
1. Apply Floyd's algorithm to find all-pair shortest paths for the graph given problem.



2. Apply Dijkstra's algorithm to find single source shortest path for the given graph. Also write the algorithm.



3. Apply Kruskal's algorithm to find the minimum spanning tree of a given graph.



4. Consider S={3,5,6,7} and d = 15. Find all possible subsets where the sum of elements in each subset is equal to d, using back tracking technique. Show the state-space tree.

5. Explain with an illustrative example branch and bound technique.

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