USN ☐☐☐☐☐☐☐☐☐☐

Fourth Semester MCA Degree Examination, December 2012
Design and Analysis of Algorithms

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a.   Mention the general plan for analyzing the efficiency of recursive algorithm. Suggest an algorithm to find the Fibonacci of a number using recursive approach and find its time complexity.   **(06 Marks)**
    b.   Define the three asymptotic notations.   **(06 Marks)**
    c.   Explain the Brute force sequential search algorithm and analyze the time efficiency for best, worst and average cases.   **(08 Marks)**

2   a.   Explain and design the binary search algorithm with an example. Using decision tree show the time complexity for successful and unsuccessful searches.   **(10 Marks)**
    b.   Write and explain the quick sort algorithm using divide and conquer method. Also analyze its average case time efficiency using the recurrence equation.   **(10 Marks)**

3   a.   Explain and design Prim's algorithm and apply it for the given graph to find minimum cost spanning tree.   **(10 Marks)**
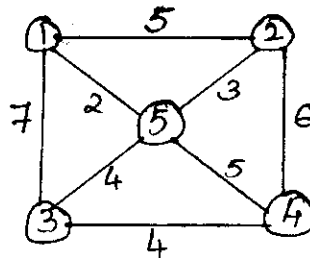

Fig.Q.3(a)

    b.   What is greedy technique? Explain and design the algorithm for single source shortest path by considering an example.   **(10 Marks)**

4   a.   Write the Floyd's algorithm. Explain the same with an example and mention its time efficiency.   **(10 Marks)**
    b.   Solve the traveling sales person problem using dynamic programming technique. Edge length matrix is as shown below.   **(10 Marks)**

$$
\begin{array}{c}
 \quad 1 \quad\, 2 \quad\, 3 \quad\, 4 \\
\begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array}
\begin{bmatrix}
0 & 12 & 18 & 14 \\
7 & 0 & 11 & 15 \\
9 & 13 & 0 & 12 \\
8 & 8 & 9 & 0
\end{bmatrix}
\end{array}
$$

5   a.   Compare and contrast DFS and BFS traversals.   **(10 Marks)**
    b.   Explain Horspool's algorithm. Apply it to search for the pattern 'BARBER' in the below text: JIM_SAW_ME_IN_THE_BARBERSHOP.   **(10 Marks)**

6 a. Find the transitive closure using Warshall's algorithm, given below is the adjacency matrix.

(12 Marks)

$$\begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{cccc} a & b & c & d \\ \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

 b. Explain the concept of P, NP and NP – complete problem. (08 Marks)

7 a. Distinguish between backtracking and branch and bound methods. (04 Marks)
 b. Apply backtracking to solve the following instance of the subset-sum problem:
 S = {1, 3, 4, 5} and d = 9. (08 Marks)
 c. Explain the approximation algorithms for the knapsack problem. And also write the Greedy algorithm for discrete and continuous approach. (08 Marks)

8 a. Briefly explain the computational model. (08 Marks)
 b. Write a short note on decision trees. (06 Marks)
 c. Write in brief about list ranking. (06 Marks)

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