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10MCA44

Fourth Semester MCA Degree Examination, June/July 2013

Design and Analysis of Algorithms

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. What are asymptotic notations? Brief them by using some suitable examples. **(10 Marks)**
    b. Explain a general plan for analysis non-recursive algorithm. **(04 Marks)**
    c. Write an algorithm for Brute force string matching algorithm. **(06 Marks)**

2 a. Justify, if $t_1(n) \in 0 (g_1(n))$ and $t_2(n) \in 0 (g_2(n))$ then $t_1(n) + t_2(n) \in 0 (\max\{g_1(n), g_2(n)\})$. **(08 Marks)**
    b. Illustrate general method for solving a problem by using divide and conquer design technique. **(04 Marks)**
    c. Write an algorithm for merge sort. Obtain its analysis by using Masters theorem. **(08 Marks)**

3 a. Write a greedy algorithm for identifying minimum spanning tree by using Prim's algorithm for a given graph G(V, E). **(08 Marks)**
    b. Obtain the minimum spanning tree for the following graph G(V, E) by using Kruskal's algorithm. **(08 Marks)**
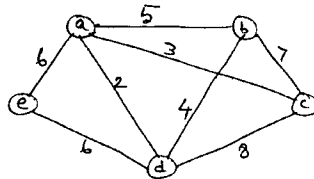

Fig.Q3(b)

    c. Illustrate a general method for solving a problem by using dynamic programming. **(04 Marks)**

4 a. Write an algorithm for obtain all pairs shortest path using Floyd's algorithm. Explain it with a suitable example. **(10 Marks)**
    b. Write an algorithm for solving 0/1 Knapsack problem, explain it by following inputs:

Item #	1	2	3	4
Weight	2	3	1	2
Profit	20	30	10	20

Total capacity of Knapsack, W = 5. **(10 Marks)**

5 a. Explain decrease and conquer design technique by using an algorithm for insertion sort. **(10 Marks)**
    b. Write Horspool's algorithm for string matching. Explain it with following inputs:
       Text: THIS IS A DEMO FOR STRING MATCHING
       Patten: DEMO **(10 Marks)**

6 a. List and explain the 3 constraints for estimating lower bounds. **(06 Marks)**
    b. Explain P, NP and NP complete problems with an example. **(08 Marks)**
    c. How decision trees are helpful to study performance of algorithm? **(06 Marks)**

7 a. What is Backtracking? Explain it by using n-queens problem. **(08 Marks)**
    b. Write to solve assignment problem by using Branch and Bound technique. **(08 Marks)**
    c. Define NP-Hard problem. **(04 Marks)**

8 a. List and explain the 2 approximation algorithms for traveling salesman problem. **(10 Marks)**
    b. Explain parallel algorithm for prefix computation and list ranking. **(10 Marks)**

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