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10CS43

Fourth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Find gcd(31415, 14142) by applying Euclid's algorithm. Estimate how many times it is faster when compared to the algorithm based on consecutive integer checking. **(04 Marks)**

b. Compare the order of growth of $\frac{1}{2}n(n-1)$ and n^2. **(04 Marks)**

c. Explain the mathematical analysis of fibonacci recursive algorithm. **(06 Marks)**

d. Write Bruteforce string matching algorithm. **(06 Marks)**

2 a. Find the upper bound of recurrences given below by substitution method.

i) $2T\left(\frac{n}{2}\right)+n$ ii) $T\left(\frac{n}{2}\right)+1$ **(06 Marks)**

b. Sort the following elements using merge sort. Write the recursion tree.
70, 20, 30, 40, 10, 50, 60 **(06 Marks)**

c. Write the algorithm for quick sort. Derive the worst case time efficiency of the algorithm. **(08 Marks)**

3 a. Write greedy method control abstraction for subset paradigm. **(04 Marks)**

b. Using greedy method, trace the following graph to get shortest path from vertex 'a' to all other vertices. **(06 Marks)**

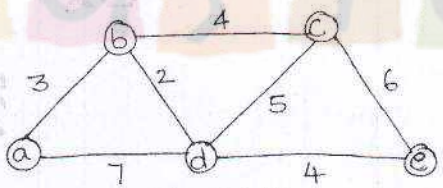

Fig. Q3 (b)

c. What is the solution generated by the function job scheduling (JS) when n = 5,
$[P_1, P_2, P_3, P_4, P_5] = [20, 15, 10, 5, 1]$ and
$[d_1, d_2, d_3, d_4, d_5] = [2, 2, 1, 3, 3]$ **(06 Marks)**

d. Apply PRIMS algorithm for the following graph to find minimum spanning tree. **(04 Marks)**

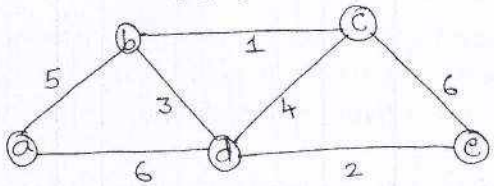

Fig. Q3 (d)

4 a. Using dynamic programming, compute the shortest path from vertex 1 to all other vertices. **(10 Marks)**

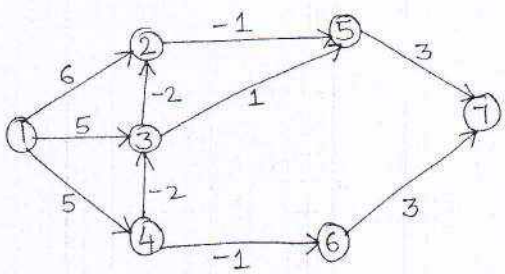

Fig. Q4 (a)

4 b. Solve the Knapsack instance n = 3, $\{W_1, W_2, W_3\} = \{1, 2, 2\}$ and $\{P_1, P_2, P_3\} = \{18, 16, 6\}$ and M = 4 by dynamic programming. **(04 Marks)**

c. For the given graph, obtain optimal cost tour using dynamic programming. **(06 Marks)**

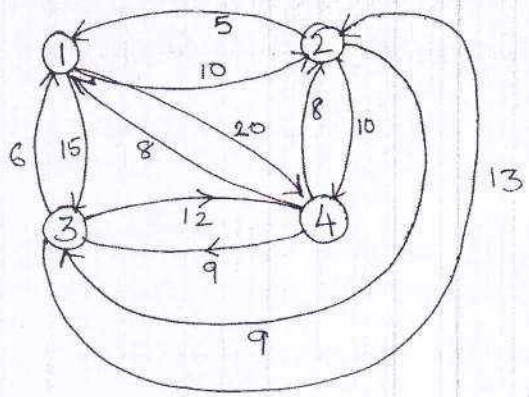

Fig. Q4 (c)

PART – B

5 a. What are the three variations of decrease and conquer technique. **(03 Marks)**

b. Conduct DFS for the following graph: **(05 Marks)**

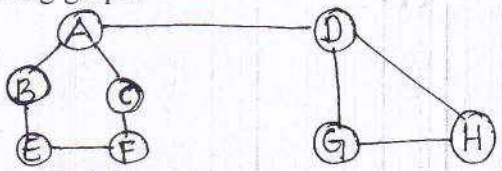

Fig. Q5 (b)

c. Apply DFS based algorithm to solve topological sorting problem for the following graph: **(06 Marks)**

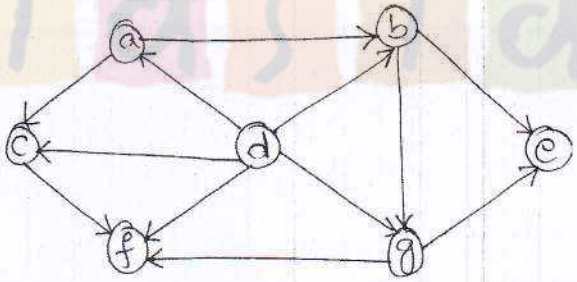

Fig. Q5 (c)

d. Construct shift table for the patternn EARN and search for the same in text FAIL – MEANS – FIRST – ATTEMPT – IN – LEARNING using Horspool algorithm. **(06 Marks)**

6 a. Explain the four methods used to establish lower bounds of algorithm. **(08 Marks)**

b. Define decision trees. Write the decision tree for the three element selection sort. **(06 Marks)**

c. Define P, NP and NP complete problems. **(06 Marks)**

7 a. Explain how back tracking used for solving 4-queens problem. Write the state space tree. **(06 Marks)**

b. Solve the following assignment problem using branch and bound method. **(08 Marks)**

	Job1	Job2	Job3	Job4
Person a	9	2	7	8
Person b	6	4	3	7
Person c	5	8	1	8
Person d	7	6	9	4

7 c Apply twice-around-the-tree algorithm for the travelling sales person problem for the following graph. **(06 Marks)**

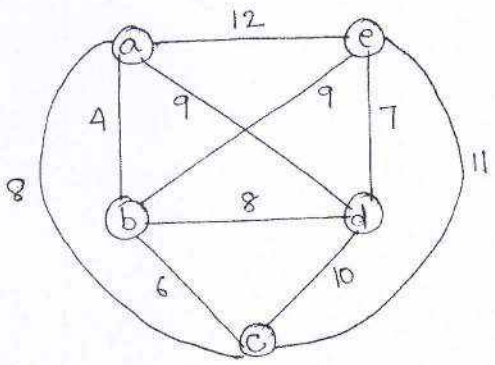

Fig. Q7 (c)

8 a. Explain the various models for parallel computations. **(09 Marks)**

b. Let the i/p to the prefix computation be 5, 12, 8, 6, 3, 9, 11, 12, 1, 5, 6, 7, 10, 4, 3, 5 and there are four processors and $\oplus$ stands for addition. With diagram explain how prefix computation is done by parallel algorithm. **(08 Marks)**

c. Explain how matrix $\tilde{M}$ is computed using parallel algorithm for the given graph. **(03 Marks)**

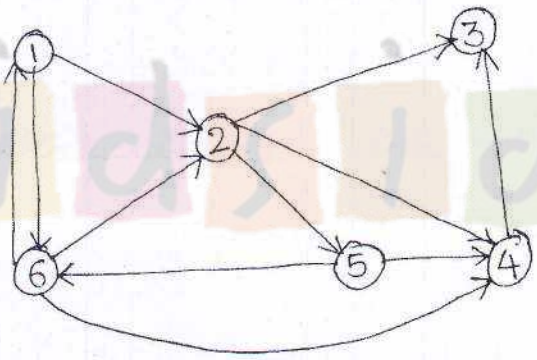

Fig. Q8 (c)

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