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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)

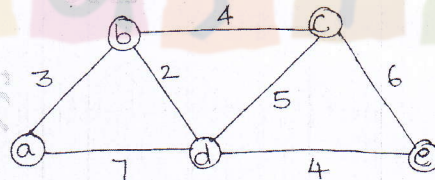


Fig. Q3 (b)

- 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)

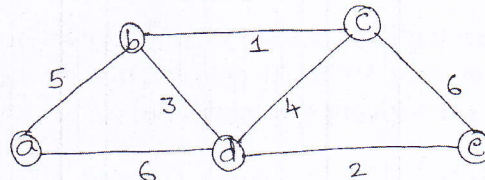


Fig. Q3 (d)

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

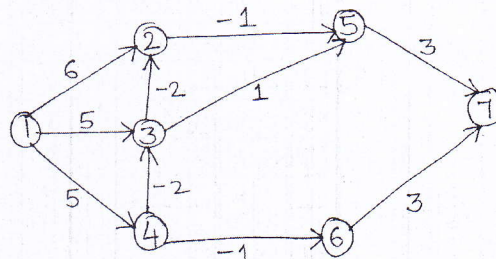


Fig. Q4 (a)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8=50, will be treated as malpractice.

- 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)

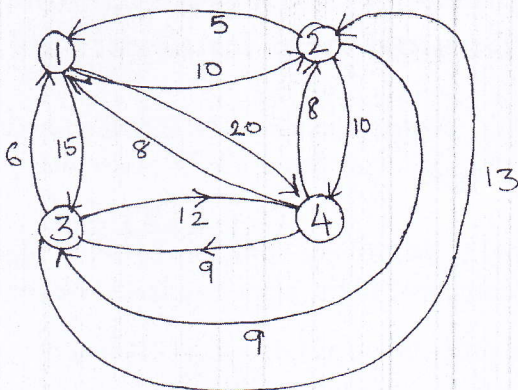


Fig. Q4 (c)

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)

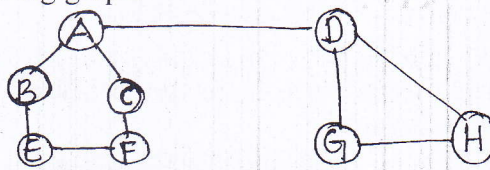


Fig. Q5 (b)

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

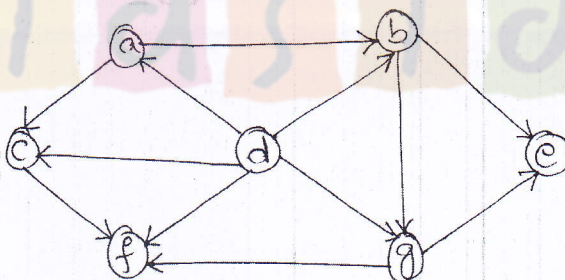


Fig. Q5 (c)

- d. Construct shift table for the pattern 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)

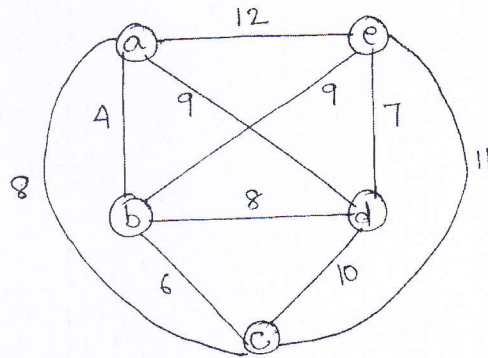


Fig. Q7 (c)

- 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 M is computed using parallel algorithm for the given graph. (03 Marks)

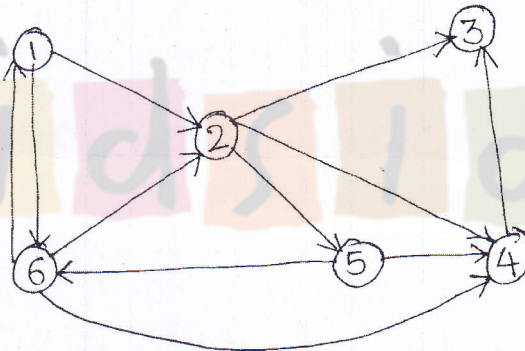


Fig. Q8 (c)
