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13MCA41

Fourth Semester MCA Degree Examination, Dec.2016/Jan.2017
Analysis and Design of Algorithms

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Define algorithm. **(02 Marks)**

b. Discuss the fundamentals of algorithmic problem solving techniques. **(06 Marks)**

c. Explain the following asymptotic notations:
i) Big oh ii) Big omega iii) Big theta. **(12 Marks)**

2 a. Write an algorithm for selection sort and analyze its efficiency. Also trace the algorithm for the following input: 89 45 68 90 29. **(12 Marks)**

b. Implement brute-force string matching algorithm with an example and analysis. **(08 Marks)**

3 a. Write an algorithm for quicksort. Analyze the algorithm with respect to worst case. **(10 Marks)**

b. Illustrate preorder, inorder and post order traversal in the following binary tree. **(03 Marks)**

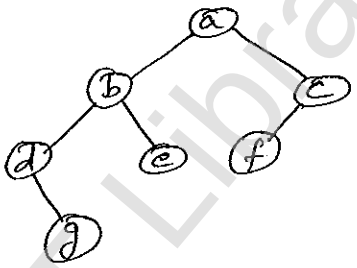

Fig.Q.3(b)

c. Discuss strassen's matrix multiplication. Also evaluate the asymptotic efficiency of this algorithm. **(07 Marks)**

4 a. Write the pseudocode of insertion sort algorithm and its efficiency. Trace the algorithm for the following input: 85 40 65 92. **(10 Marks)**

b. Give depth first search algorithm with its efficiency. **(05 Marks)**

c. Write Johnson-Trotter algorithm for generating permutations. **(05 Marks)**

5 a. Write an algorithm for comparison counting sort with its efficiency. **(05 Marks)**

b. Implement the pseudocode of Horspool's algorithm for string matching. **(07 Marks)**

c. Define Hashing. Discuss about closed hashing. **(08 Marks)**

6 a. Write Floyd's algorithm for all-pairs shortest path problem. Also apply the algorithm for the following diagraph: **(10 Marks)**

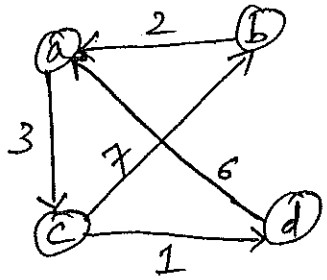

Fig.Q.6(a)

b. Solve the following knapsack problem using dynamic programming algorithm. **(10 Marks)**

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

Capacity of the knapsack W = 5.

7 a. Write Prim's algorithm for constructing minimum spanning tree. Implement the algorithm in the following graph: **(10 Marks)**

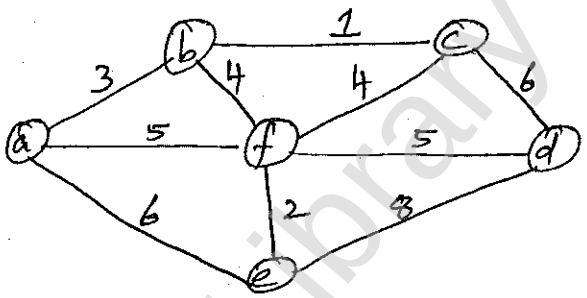

Fig.Q.7(a)

b. Give the pseudocode of Dijkstra's algorithm for single-source shortest paths. Apply the algorithm in the following graph. **(10 Marks)**

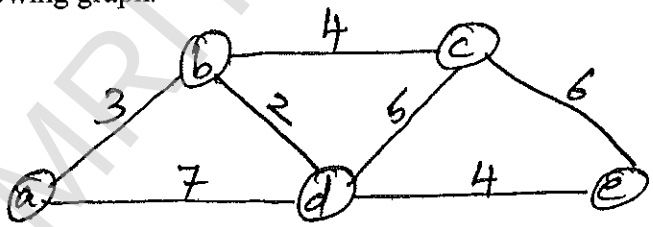

Fig.Q.7(b)

8 a. Discuss N-queen's problem. **(06 Marks)**

b. Explain Traveling-Salesman problem with an example. **(08 Marks)**

c. Write short notes on P, NP and NP-complete problems. **(06 Marks)**

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