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)**

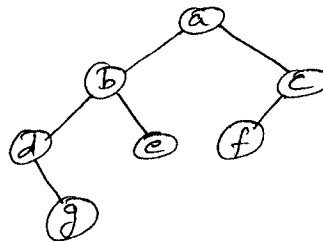Fig.Q.3(b)

    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
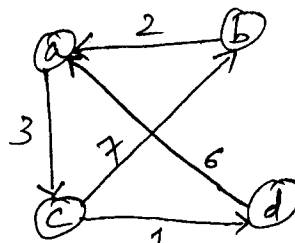   following diagraph: **(10 Marks)**

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)**
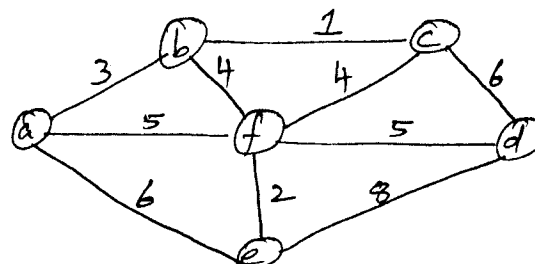

Fig.Q.7(a)

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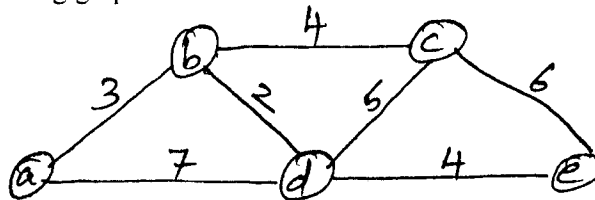

Fig.Q.7(b)

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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