

**Fourth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014**  
**Design and Analysis of Algorithms**

Time: 3 hrs.

Max. Marks: 100

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

**PART – A**

- With the help of a flow chart, explain the various steps of algorithm design and analysis process. (08 Marks)
  - If  $f_1(n) \in O(g_1(n))$  and  $f_2(n) \in O(g_2(n))$  prove that  $f_1(n) + f_2(n) \in O(\max \{g_1(n), g_2(n)\})$ . (04 Marks)
  - Write an algorithm for selection sort and show that the time complexity of this algorithm is quadratic. (08 Marks)
- What is divide and conquer method. Show that the worst case efficiency of binary search algorithm is  $O(\log n)$ . (10 Marks)
  - Explain quick sort algorithm. Find the time complexity of quick sort for best case, worst case and average case. (10 Marks)
- Write Krushal's algorithm to construct a minimum spanning tree and show that the time efficiency is  $O(|E|\log|E|)$ . (08 Marks)
  - Apply Kruskal's algorithm to find the min spanning tree of the graph. (08 Marks)

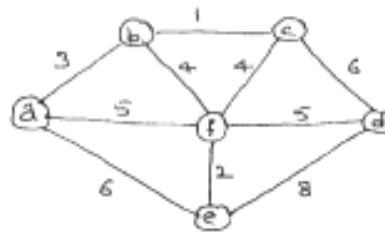


Fig. Q3(b)

- Write Dijkstra's algorithm to find single source shortest path. (04 Marks)
- Write the dynamic programming algorithm to compute binomial co-efficient and obtain its time complexity. (04 Marks)
    - Explain Warshall algorithm to find the transitive closure of a directed graph. Apply this algorithm to the graph given below. (08 Marks)

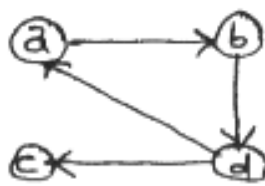


Fig. Q4(b)

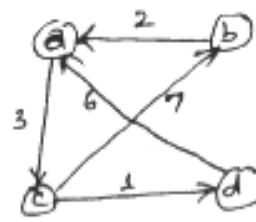


Fig. Q4(c)

- State Floyd's algorithm. Solve all pairs shortest path problem for the given graph using Floyd algorithm. (08 Marks)

## PART – B

- 5 a. Explain decrease and conquer method, with a suitable example. (04 Marks)  
 b. Apply the DFS – based algorithm to solve the topological sorting problem for given graph. (08 Marks)

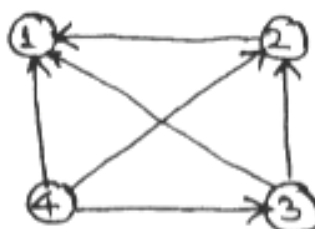


Fig. Q5(b)

- c. State Horspool's algorithm for pattern matching. Apply the same to search for the pattern BARBER in a given text. (08 Marks)
- 6 a. Prove that the classic recursive algorithm for the tower of Hanoi puzzle makes the minimum number of disks moves needed to solve it. (08 Marks)  
 b. Write short notes on : (12 Marks)  
 i) Tight lower bound  
 ii) Trivial lower bound  
 iii) Information theoretic lower bound.
- 7 a. Explain how the TSP problem can be solved, using branch and bound method. (06 Marks)  
 b. Explain back-tracking concept and apply the same to n-queens problem. (08 Marks)  
 c. Solve 8 – queens problem for a feasible sequence (6, 4, 7, 1). (06 Marks)
- 8 a. Write short notes on : (10 Marks)  
 i) Hamiltonian problem  
 ii) M – Coloring. (10 Marks)  
 b. Explain prefix computation problem and list ranking algorithm, with suitable examples. (10 Marks)

\*\*\*\*\*