

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

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

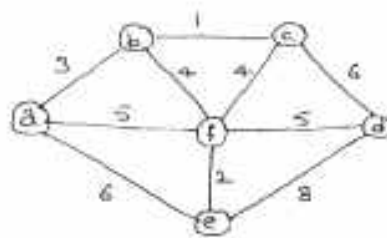


Fig. Q3(b)

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

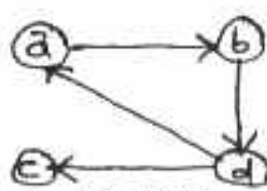


Fig. Q4(b)

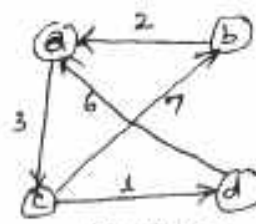


Fig. Q4(c)

- 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)

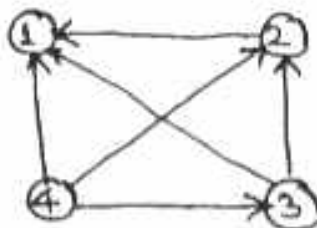


Fig. Q5(b)

- 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 :
 i) Tight lower bound
 ii) Trivial lower bound
 iii) Information theoretic lower bound. (12 Marks)
- 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 :
 i) Hamiltonian problem.
 ii) M – Coloring. (10 Marks)
 b. Explain prefix computation problem and list ranking algorithm, with suitable examples. (10 Marks)
