

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 $\theta(\log n)$. (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)

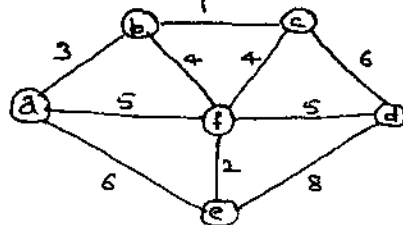


Fig. Q3(b)

- 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)

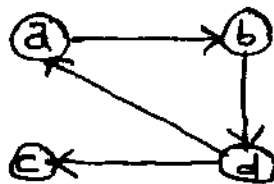


Fig. Q4(b)

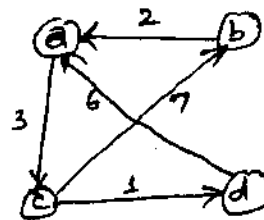


Fig. Q4(c)

- 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)

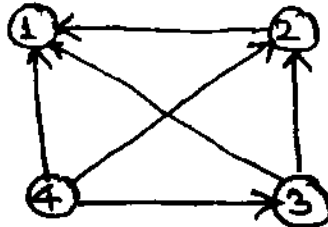


Fig. Q5(b)

- 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)
