



USN

Grid for USN entry

10CS43

Fourth Semester B.E. Degree Examination, June/July 2018
Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks:100

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

PART - A

- 1 a. Write an algorithm to find GCD (m, n) using EUCLID's method and solve for GCD(60, 24). (05 Marks)
b. Sort the list E, X, A, M, P, L, E in alphabetical order by using selection sort. (05 Marks)
c. Write a general plan for analyzing efficiency of recursive algorithm. Analyze Tower of Hanoi problem for efficiency. (10 Marks)
2 a. Solve the Recurrence relations below and find upper bound:
(i) T(n) = T(n/2) + 1 (ii) T(n) = 2T(n/2) + n (05 Marks)
b. Sort the list E, X, A, M, P, L, E in alphabetical order by using merge sort. (05 Marks)
c. Write an algorithm for Quick Sort. Solve for 5, 5, 8, 3, 4, 3, 2 in ascending order. Is quick sort a stable algorithm? Give reasons. (10 Marks)
3 a. Using Greedy method, find an optimal solution to knapsack instance n=7, M=15
Profits = (10, 5, 15, 7, 6, 18, 3)
Weights = (2, 3, 5, 7, 1, 4, 1) (05 Marks)
b. Write an algorithm for Dijkstra's single source shortest path. (05 Marks)
c. Write Kruskal's algorithm for finding minimum cost spanning tree. Solve on Fig.Q3(c). (10 Marks)

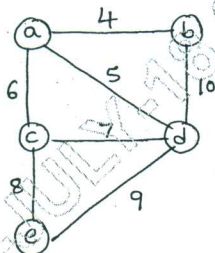


Fig.Q3(c)

- 4 a. Explain 0/1 knapsack problem and solve for the instance N = 3, M = 4 using Dynamic programming weights = [1, 2, 2], profits = [18, 16, 6]. (05 Marks)
b. Apply Warshall's algorithm to find transitive closure of the digraph defined by the following adjacency matrix. (05 Marks)

Adjacency matrix table with rows a, b, c, d and columns a, b, c, d

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. What is Traveling salesperson problem? Using dynamic programming strategy obtain optimal tour for the following matrix: (10 Marks)

$$\begin{bmatrix}
 0 & 10 & 15 & 20 \\
 5 & 0 & 9 & 10 \\
 6 & 13 & 0 & 12 \\
 8 & 8 & 9 & 0
 \end{bmatrix}$$

PART - B

- 5 a. What is DFS? How can we use DFS for identifying connected components of a graph? Explain with suitable graph. (05 Marks)
- b. Apply Boyer - Moore algorithm to search for the pattern BAOBAB in the text BESS_KNEW_ABOUT_BAOBAB. (05 Marks)
- c. Obtain topological order for the digraph Fig.Q5(c) using source removal method and DFS based algorithm. (10 Marks)

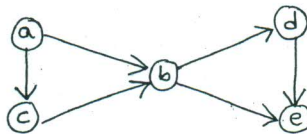


Fig.Q5(c)

- 6 a. Define Decision Trees. Construct decision tree for three-element insertion sort. (05 Marks)
- b. Explain NP and NP-complete problems. Give examples. (05 Marks)
- c. What is Numerical analysis? Explain the following with examples:
 (i) Truncation error (ii) Round off error (iii) Subtraction cancellation. (10 Marks)
- 7 a. Explain N-Queens problem. Obtain states space tree for solving 4-Queens problem. (05 Marks)
- b. Write Twice-around-the-tree approximation algorithm for traveling salesperson problem. (05 Marks)
- c. Using Branch and Bound technique solve for TSP refer Fig.Q7(c). (10 Marks)

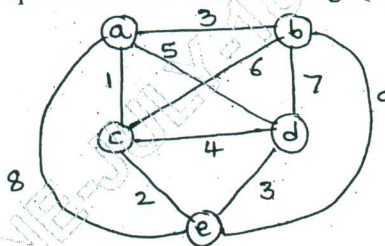


Fig.Q7(c)

- 8 a. What are the different ways of resolving Read and Write conflicts? (05 Marks)
- b. Explain steps involved in computation of matrix \tilde{M} using parallel algorithm. (05 Marks)
- c. What is prefix computation problem? Let input to the prefix computation be 5, 12, 8, 6, 3, 9, 11, 12, 1, 5, 6, 7, 10, 4, 3, 5 and there are 4 processors and \oplus stands for addition. With a diagram explain how prefix computation is done by parallel algorithm. (10 Marks)
