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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, Master of Computer Applications (MCA)

Semester End Examination; May/ June - 2019

Design and Analysis of Algorithms

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Give three algorithm techniques to find GCD of two numbers. Apply it for 40 and 50. 12

b. Explain fundamental data structures. 8

2 a. Explain various asymptotic notations and basic efficiency classes used in analyzing algorithm. 8

b. Write the general plan for analyzing recursive algorithm. Write an algorithm to find factorial of *N* and analyze its time efficiency. 12

UNIT - II

3 a. Write Bubble sort algorithm and derive its time efficiency. Trace for 40, 50, 30, 20, 10. 12

b. Design string matching algorithm using Brute force. Derive its time efficiency. 8

4 a. Write an algorithm for Merge sort. Trace the algorithm for 10, 20, 40, 50, 15, 25, 30. 12

b. Construct binary tree for 60, 10, 90, 70, 5, 50, 100 and apply three techniques of tree traversal. 8

UNIT - III

5 a. Write an algorithm to traverse the graph using Breath First Search (BFS). Trace the algorithm with an example. 12

b. Generate permutations for {1, 2, 3, 4} using Bottom up minimal change method. 8

6 a. Write an algorithm for topological sort based on source removal method and explain with an example. 8

b. What is the need of an AVL tree? Construct and trace AVL tree for 100, 200, 300, 250, 270, 70, 40. 12

UNIT - IV

7 a. Write an algorithm for sorting using comparison by counting method. Trace for 25, 45, 10, 20, 50, 15. 12

b. Apply Horspool's algorithm to search for pattern BARBER in the text "SHE-SAW-ME-IN-BARBER-SHOP". 8

Contd…2

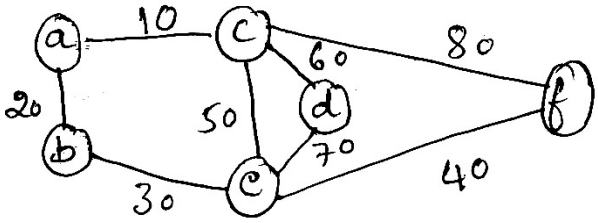
8 a. Write an algorithm and trace for computing binomial coefficient using Dynamic programming for ${}^{6}C_{3}$. 8

b. Write Warshall's algorithm. Apply the algorithm to compute transitive closure for adjacency matrix

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$ 12

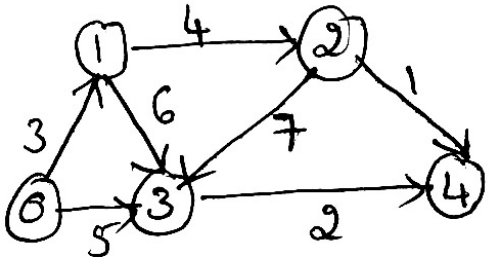
UNIT - V

9 a. Apply Prim's and Kruskal's method to find minimum spanning tree for the given graph,



10

b. Write Diskstra's algorithm and find shortest paths considering vertex '*0*' as source for the given graph,



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10 a. What is Backtracking. Explain 4 queens problem with state space trees. 12

b. Solve using branch and bound assignment problem,

$$A = \begin{array}{c|cccc} & J_1 & J_2 & J_3 & J_4 \\ \hline P_1 & 9 & 2 & 7 & 8 \\ P_2 & 6 & 4 & 3 & 7 \\ P_3 & 5 & 8 & 1 & 8 \\ P_4 & 7 & 6 & 9 & 4 \end{array}$$ 8

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