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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; June - 2017
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. Write Euclid's algorithm to find GCD of 2 Numbers. Apply it to find gcd (31415, 14142).   10

  b. Define Algorithm. List the characteristics of an Algorithm.   6

  c. Write a short note on measuring an Input size in Analysis framework.   4

2 a. Discuss a sequence of steps one typically goes through in designing and analyzing an algorithm.   8

  b. Write the formal definitions of asymptotic notations.   6

  c. Give the general plan for analyzing the time efficiency of Non-recursive algorithms. Write an algorithm to find largest element in a given array.   6

UNIT - II

3 a. What is Brute Force approach? Write selection sort algorithm and derive its efficiency with an example.   10

  b. Write merge sort algorithm and derive its efficiency. Apply the algorithm to sort the list E, X, A, M, P, L, E in alphabetical order.   10

4 a. Explain Brute Force String matching with an example.   8

  b. Discuss quick sort algorithm and derive the worst case efficiency.   8

  c. Discuss any one method of Binary Tree Traversals.   4

UNIT - III

5 a. Write Breath first search algorithm. Explain how to check graph's acyclicity?   10

  b. Apply the DFS based algorithm to solve the topological sorting problem for the following digraphs.   10
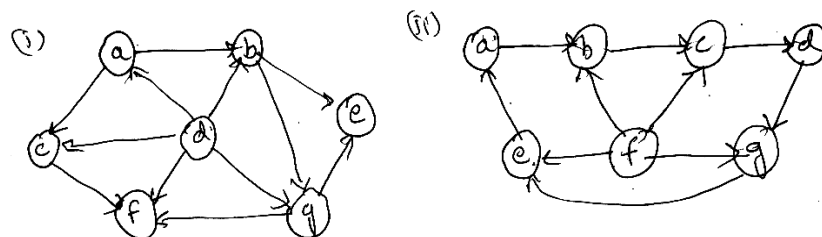
6 a. Write the major variations of Transform-and-Conquer. Design a presorting based algorithm for solving the problem of checking the uniqueness of element in the given array.   10

b. Define AVL tree. Explain the four rotation types for AVL trees with 3 nodes. Construct the AVL tree for the list 5, 6, 8, 3, 2, 4, 7 by successive insertions.　　10

UNIT - IV

7 a. Write an algorithm for sorting by distribution counting. Trace the algorithm for the given data with distribution values 1, 4, 6 for the array 13, 11, 12, 13, 12, 12.　　10

b. Describe Horspool's algorithm and apply to search the pattern BARBER in the text
JIM – SAW – ME – IN – A – BARBER SHOP　　10

8 a. What is dynamic programming? Apply dynamic programming to the following instance of the Knapsack problem with capacity W = 6.　　10

Item	1	2	3	4	5
Weight	3	2	1	4	5
Value (`)	25	20	15	40	50

b. Write Warshall's algorithm. Apply the algorithm to find the transitive closure of the diagraph defined by the adjacency matrix. Prove that the time efficiency of Warshall's algorithm is cubic.
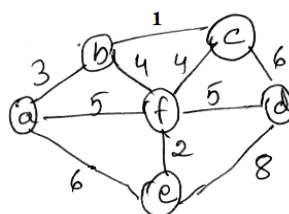
$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$
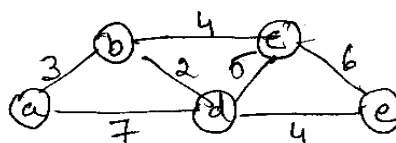
10

UNIT – V

9 a. Explain Prim's algorithm to find minimum spanning the. Apply the same for the graph given below.

10

b. State and explain Dijkstra's algorithm to find single source shortest path. Find the shortest path from a given vertex to each other vertex of a weighted graph ('*a*' is the starting vertex).

10

10 a. Describe P, NP and NP-complete problem in detail.　　10

b. Define Backtracking and explain four-queen problem with state-space trees.　　10

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