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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Fourth Semester - Master of Computer Applications (MCA)
Semester End Examination; June - 2016
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.	Explain the algorithm design and analysis process with a neat flow chart.	10
b.	Explain the mathematical analysis of non-recursive algorithms. Write an algorithm to find the largest element in a given list of *n* numbers and analyze its time complexity.	10
2 a.	Explain the concept of asymptotic notations indicating the commonly encountered notations with example.	10
b.	Describe the following with an example : i) Best case efficiency ii) Average case efficiency iii) Worst case efficiency.	10

UNIT - II

3 a.	Write pseudo code for selection sort and bubble sort and compare their order of growth.	10
b.	Write Brute force string matching algorithm and determine its time complexity. Determine the number of character comparisons made by the Brute force algorithm in searching for the pattern ONE in the text ATTITUDE$DECIDES$ONES$ALTITUDE.	10
4 a.	Give the algorithm for merge sort. Trace its operation on the following sequence of numbers 9, 2, 3, 7, 6, 4, 8, 1.	10
b.	Write short notes on application of divide and conquer on binary trees and write pseudo code to traverse the binary tree.	10

UNIT - III

5 a. Write the DFS algorithm and apply it to solve the topological sorting problem for the following digraph.

                                                              10
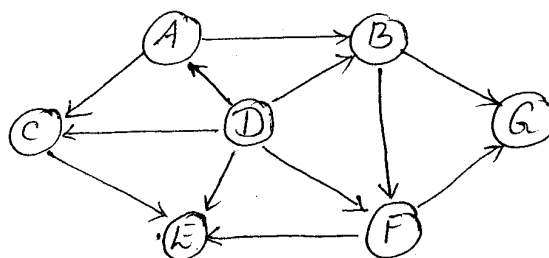
b.	Write the pseudocode for Johnson Trotter (n) algorithm for generating permutations. Explain the algorithm with reference to example list 1, 2, 3, 4 (n = 4).	10
6 a.	Write a short note on presorting. Write the algorithm to check element uniqueness in an array.	10

b. Write and explain heap sort algorithm and indicate the best case, worst case and average case efficiency class. Sort the elements S, O, R, T, I, N, G in alphabetical order.　　10

UNIT - IV

7 a. Apply comparison counting sort for the example 62, 31, 84, 96, 19, 47 by depicting its algorithm.　　10

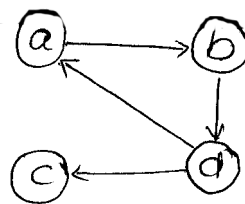b. Discuss Horspool's string matching algorithm. Apply this to find the pattern ABABC in the text BAABABABCCA.　　10

8 a. Apply bottom up dynamic programming technique to the following instance of the knapsack problem.

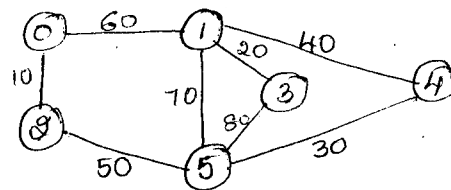| Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

Capacity W = 5.　　10

b. With quote of Warshall's algorithm find transitive closure for the digraph.

10

UNIT - V

9 a. Write Prim's algorithm to find the minimum spanning tree and apply the same for the given graph.

10

b. Generate the code word with the Huffman tree for the following :

A	B	C	D	E	-
0.1	0.15	0.05	0.1	0.4	0.2

Encode the text BDEAAD and decode 10011011001111010.　　10

10 a. With a description on decision tree and its application, write and explain the decision tree for the three element selection sort.　　10

b. Write a detailed note on NP hard and NP complete problem with an example each.　　10

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