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

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Information Science and Engineering

Semester End Examination; May/June - 2018

Analysis and Design of Algorithms

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1 a. With a flow chart, explain the fundamental steps involved in design and analysis process of algorithmic problem solving technique. 10

b. "Organizing data play a critical role in the design and analysis of Algorithms": Justify the above sentence with a list and brief description of various data structures that are important in the same. 10

2 a. List and explain basic asymptotic efficiency classes that are considered to represent the efficiency of an algorithm. 10

b. Design a recursive algorithm to solve "Tower of Hanoi" Puzzle and hence find the efficiency of the same considering the general plan for analyzing time efficiency of Recursive algorithm. 10

UNIT - II

3 a. Describe brute-force approach of designing an algorithm. What are the advantages and disadvantages of this approach? 5

b. Write a note on "Exhaustive Search" algorithm to solve a combinatorial problem with an illustration. 7

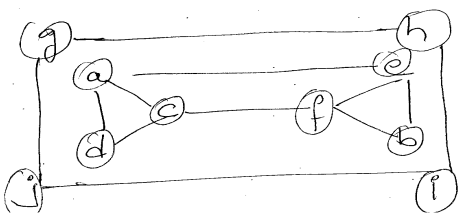
c. Write "Bubble Sort" algorithm and sort the following list
[za, ab, cd, ca, az, ea, aa] 8

4 a. Devise a Divide and Conquer technique "Quick Sort" algorithm to sort a given list of integers and trace the same for [5,3,1,9,8,2,4,7] 10

b. Demonstrate how Strassen's matrix multiplication can reduce the number of one-digit multiplication in multiplying 2 matrixes. 10

UNIT - III

5 a. Design DFS and BFS algorithm which illustrate the decrease and conquer technique Trace the same algorithm on the following graph to traverse through all the nodes.



14

b. Explain the working of Decrease and Conquer technique of designing an algorithm along with its three major variations. 6

Contd…2

6 a. Discuss on the advantages of "presorting"and how it enhance the efficiency of an algorithm? 8

b. What is a "Heap"? Write an algorithm to construct a Heap and hence use the same to sort a given list of elements. Trace the above set of algorithm to sort the list [2, 9, 7, 6, 5, 8]. 12

UNIT - IV

7 a. Write "Horspool's String Matching" Algorithm and explain the working of the algorithm considering an illustration of your choice. 10

b. "Time and Space- Do not have to compete with each other in all designing algorithm": Substantiate the above sentence using "Hashing" as technique to search an element from a list. 10

8 a. Explain how Dynamic programming technique helps in solving an overlapping subproblems. 4

b. Write Warshall's Algorithm to compute the transitive closure of a directed graph and discuss the efficiency of the same. 8

c. Apply the bottom-up dynamic programming algorithm to the following instance of ten knapsack problem

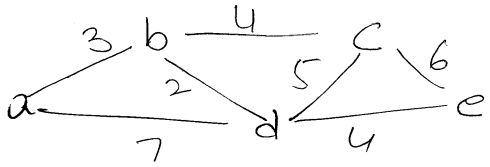
Item	Weight	Value
1	2	$12
2	1	$10
3	3	$20
4	2	$15

8

Capacity W = 5.

UNIT - V

9 a. Write Dijkstra's algorithm and trace the same for the following graph to find single source shortest path.



10

b. Construct a Huffman tree for the following data and obtain its Huffman code

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

10

Hence, what is the code for [DAD]. Also find the decoded characters for 10011011011101.

10 a. List the difference between greedy technique and dynamic programming technique of solving a problem. 4

b. Define the following: 6

i) P and NP problems ii) Backtracking

c. Explain the Branch and Bound technique of addressing a problem towards solution with an illustration of your choice. 10

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