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06CS43

Fourth Semester B.E. Degree Examination, December 2011
Analysis and Design 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. With the help of a flowchart, explain in detail, the various stages of algorithm design and analysis process. **(10 Marks)**

b. Explain the analysis framework of algorithms. Explain the worstcase, bestcase and average case efficiencies, with an algorithm. **(10 Marks)**

2 a. Explain the concept of asymptotic notations and basic efficiency classes, with examples. Explain 0, θ, and Ω, with examples. **(10 Marks)**

b. Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of a number. Derive its efficiency. **(10 Marks)**

3 a. Explain the brute force method for algorithm analysis and design. Explain the brute force string matching algorithm, with an example. Give its efficiencies. **(10 Marks)**

b. Explain the binary searching algorithm in detail, with an example. Show that worst case efficiency of binary search is in θ(log n). **(10 Marks)**

4 a. What is decrease and conquer? Give an example. Describe the insertion sort algorithm. The data elements [89, 45, 68, 90, 29, 34, 17] sort in the ascending order, using the same algorithm. **(10 Marks)**

b. Explain the DFS algorithm in detail, with an example. Give the differences between DFS and BFS. **(10 Marks)**

PART – B

5 a. Explain the transform and conquer in detail, with an example. Construct an AVL tree and 2–3 tree for the i/p sequence 1, 2, 3, 4, 5, 6 with the neat tree diagram. Explain the AVL tree and 2–3 trees. **(10 Marks)**

b. Explain the Horspool's string matching algorithm for a text that comprises English letters and spaces (denoted by underscore) with a pattern BARBER. Explain all the cases of Horspool algorithm and give its efficiency. **(10 Marks)**

6 a. Explain the dynamic programming with Floyd's algorithm in detail. Apply Floyd's all pair shortest path problem for the digraph given below, in Fig. Q6(a). **(10 Marks)**

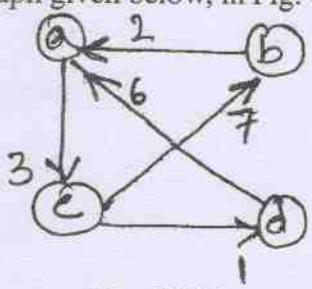

Fig. Q6(a)

b. Explain Hashing. Explain the open addressing method of hashing to insert the text "A FOOL AND HIS MONEY ARE SOON PARTED" in a hash table and delete the word "SOON" from the i/p data [Hash table size = 13]. **(10 Marks)**

7 a. Explain the concept of greedy technique with Prim's algorithm. Obtain minimum cost spanning tree for the graph below, using Prim's algorithm. **(10 Marks)**

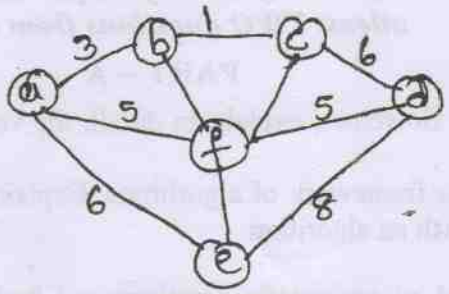

Fig. Q7(a)

b. What are Huffman trees? Explain. Give the different types of Huffman encoding. Construct a Huffman code for the following data. **(10 Marks)**

Character	A	B	C	D	–
Probability	0.4	0.1	0.2	0.15	0.15

Encode the following code, using Huffman encoding : ABCD–ABAC

8 a. What are P,NP, NP – complete problems? Give examples. Explain the backtracking, with an example. **(10 Marks)**

b. Explain the branch and bound, with an example. Solve the following Knapsack problem, using branch and bound. **(10 Marks)**

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

Capacity w = 5

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