

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 O , 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 $\theta(\log n)$. (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)

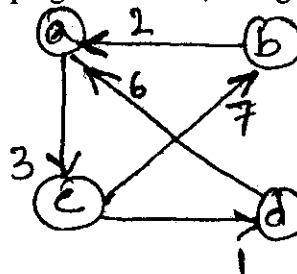


Fig. Q6(a)

- 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)

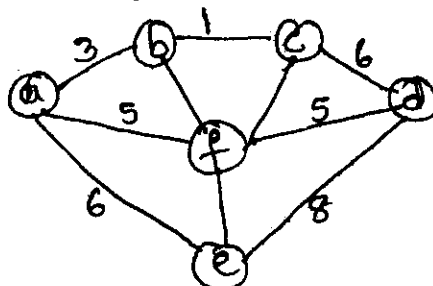


Fig. Q7(a)

- 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	Capacity w = 5
Weight	2	1	3	2	
Value	\$ 12	\$ 10	\$ 20	\$ 15	
