

ROLL NO.....

2007 ANDHRA UNIVERSITY
B.TECH COMPUTER SCIENCE ENGINEERING
II B.TECH I SEMESTER
DATA STRUCTURES

TIME: 3 HOUR
MARK: 70

- First Question Is Compulsory
- Answer Any Four From The Remaining Questions
- All Questions Carry Equal Marks
- Answer All Parts Of Any Question At One Place

1. Briefly answer the following questions:

- a. Define Abstract Data Type ? How are they used in program development.
 - b. Write the primitive operations of ADT queue.
 - c. Write the prefix and postfix equivalents to the infix expression $A/B+C-D*(E+F)$.
 - d. Write the best, worst and average case time complexity estimates of Quick Sort algorithm.
 - e. What is an Almost Complete Binary Tree? Write an application that makes use of it.
 - f. Write the applications of depth first traversal of a graph.
 - g. When does interpolation search performs better than binary search?
2. a. Assume that each element of an array 'A' stored in row-major order occupies four bytes of memory. If 'A' is declared as: `int a [10][20][5]`. And the address of the first element of 'A' is 2000, find the address of the array element `A[5][12][4]`.
- b. Write a C program to evaluate a given postfix expression using stack and explain it with an example.
3. a. Write a recursive function in C to find the nth Fibonacci number
- b. Write a non - recursive function for the above problem.
- c. Compare the efficiencies of the above two functions.
4. a. Compare and contrast the ADTs Queue and Priority Queue.
- b. Write a C function to concatenate two singly linked circular list without traversing either of them and explain it.
5. a. Discuss different ways of representing a binary tree and suggest an application for each of the representations.
- b. Explain how the threads are used to simplify the traversal of a binary tree.
6. a. Construct a binary search tree to accommodate the given list of integers.
47, 56, 23, 17, 64, 36, 29, 22
- b. Find the in order, preorder and post order sequence of nodes of the above tree.
- c. Explain the process of deletion of node '23' from the above tree and draw the resultant tree.

7. Write a C function to arrange the elements of an array in ascending order using Radix sort algorithm and explain it with a suitable example.

8. a. Discuss the Dijkstra's algorithm for finding the shortest paths from a source to all other vertices in a directed graph. What is its time complexity.

b. Apply Kruskal's algorithm to find the minimal spanning tree for a weighted undirected graph whose adjacency/weight matrix is given below.

i) Draw the graph.

ii) Show different stages of development of the above spanning tree.

iii) Find the cost of the minimal spanning tree.

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0 6 1 5 8 8
6 0 5 8 3 8
1 5 0 5 6 4
5 8 5 0 8 2
8 8 6 8 0 6
8 8 4 2 6 0
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