

School of Computing Science and Engineering

B.Tech CSE
ETE - Jun 2023

Time : 3 Hours

Marks : 100

Sem VIII - MCAN1260 - Data Structure

Your answer should be specific to the question asked
Draw neat labeled diagrams wherever necessary

1. Design an algorithm to find solution to the Towers of Hanoi problem. Explain the working of your algorithm with diagrams. (Assume that there are 3 disks) K2 CO2 (5)
2. What are the three asymptotic notations used to express the complexity of algorithms? Explain these notations with suitable examples and diagrams. K1 CO1 (5)
3. Define Binary Tree, Full Binary Tree, Strictly Binary Tree and Binary Search Tree. K3 CO3 (5)
4. Construct the Binary Tree whose Preorder and Inorder traversal sequences are given as below. K2 CO3 (10)
Preorder: G,B,Q,A,C,K,F,P,D,E,R,H
Inorder: Q,B,K,C,F,A,G,P,E,D,H,R

5. Write down the algorithm / program for Quick Sort. Execute your algorithm on the following set of values till the first 3 values are placed in their proper positions. K3 CO4 (10)
38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72
6. What are height balanced / AVL trees? Create an AVL tree for the following set of elements: K5 CO3 (10)
a, z, b, y, c, x, d, w, e, v, f.

OR

- Write down the algorithm for selection sort. Analyse the complexity of selection sort in its best and worst cases. K5 CO4 (10)
7. Using stacks, write an algorithm to determine whether an Infix Expression has balanced parenthesis or not. K1 CO2 (10)
 8. Construct a Binary Search Tree using the following set of values. K4 CO3 (15)
34, 23, 67, 45, 12, 54, 87, 43, 98, 75, 84, 93, 31
Redraw the BST after deleting 12, 75 and 67. Comment on your results.

OR

- Explain Heap Sort. Build a Max Heap and a Min Heap using the following list of numbers: K4 CO4 (15)
44, 30, 50, 22, 60, 55, 77, 55.
Show how the root nodes of these heaps can be deleted. Draw diagrams.
9. Write an algorithm to convert an infix expression to a postfix expression. Execute your algorithm with the following infix expression as the input K3 CO2 (15)
 $(m+n)^*(k+p)/(g/h)^{(a^b/c)}$ (Note: ^ is exponentiation)
 10. Traverse the following graph using Breadth First Search and Depth First Search Techniques. Consider vertex S as the starting vertex. K4 CO3 (15)

