

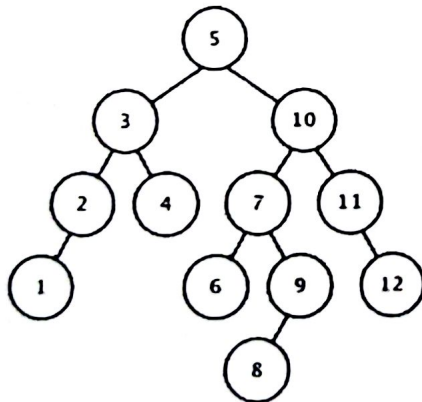


**Continuous Assessment Test (CAT-II) – October 2023**

Programme	: MCA	Semester	: Fall 2023– 2024
Course Title	: Data structures and Algorithms	Code	: PMCA501
		Slot	: A1+TA1
Faculty	: Dr. M. Jayasudha	Class Nbr	: CH2023240101712
Time	: 90 Minutes	Max. Marks	: 50

**Answer all questions**

Q.No.	Sub Sec.	Question Description	Marks
1.		Specify the pseudo code/algorithm and step by step illustration of partition sorting which gives the worst case time complexity $O(n^2)$ for the following set of elements. 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72	10
2.		Write an algorithm to implement the hash table using open addressing technique by arrays and analyse the performance. Construct a hash table of size 13 for inserting the values {8, 2, 7, 18, 15, 19, 23, 15, 20, and 16} using closed addressing techniques for collision resolution. Illustrate step by step process with neat presentation.	10
3.		Given the following AVL Tree:	



- i. Draw the resulting BST after 5 is removed, but before any rebalancing takes place. Label each node in the resulting tree with its balance factor. Replace a node with both children using an appropriate value from the node's left child. (3)
- ii. Perform the following on the rebalance tree that results from (i). Draw a new tree for each rotation that occurs when rebalancing the AVL Tree (you only need to draw one tree that results from an RL or LR rotation). You do not need to label these trees with balance factors.(3)
- iii. Write a Pseudo code / algorithm for the above scenario.(4)

4.

Suppose you are asked to store the letters of ALGORITHM in a sorted binary tree in the order they occur in the word ALGORITHM. Draw a sorted binary tree with the following properties

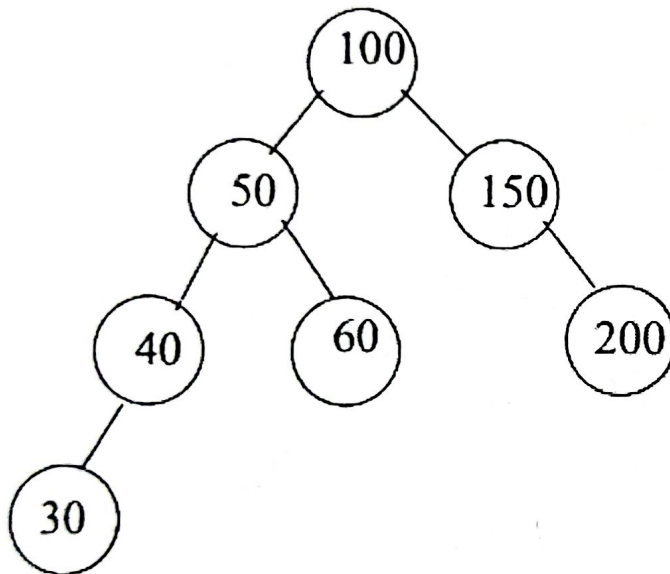
- The left subtree will contain elements lesser than the root and
- The right subtree contain elements greater than the root
- Every subtree must be a sorted binary tree.

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- i. Write an algorithm/pseudocode to create the above sorted binary tree.
- ii. State the rules followed for deletion of nodes and show the step by step procedure for deleting the nodes H, R and M.

5.

Given the BST below,



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- i. Show the BST that would result after inserting the key value 10, 180 if splaying is performed. Draw a final tree and write a Pseudo code/algorithm for the given operation using suitable rotation.(5)
- ii. Show the BST that would result after searching the key value 150, if splaying is performed. Draw a final tree and write a Pseudo code/algorithm for the given operation using suitable rotation.(5)