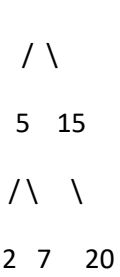
CS23302 - Data Structures

Lab -5

Date: 07.08.25

Observation Questions

1. **Difference between Binary Tree and Binary Search Tree**
   Question: Given the following binary tree structure:



2. In-order Traversal
Question: For the above binary search tree, what is the output of in-order traversal?

3. Time Complexity of BST Operations
Question: If a binary search tree is balanced, what is the time complexity of search, insert, and delete operations? What if the tree is skewed?

4. Given a binary tree:

What are the outputs of pre-order, in-order, and post-order traversals?

5. What are the Disadvantages of Unbalanced BST?

Execution Questions

1. **In-order Traversal Implementation**
   Input: A binary tree with nodes inserted as: `10`, `5`, `15`, `3`, `7`
   Write code to perform in-order traversal.

2. **BST Insertion Demonstration**
   Input: Starting with an empty BST, insert elements in order: `50`, `30`, `70`, `20`, `40`, `60`, `80`. Show the structure of BST after insertion.
3.
4. **BST Deletion Scenario**
   Input: Given BST with nodes `50`, `30`, `70`, `20`, `40`, `60`, `80`. Demonstrate deletion of nodes with different cases:

- Leaf node (`20`)
- Node with one child (`30`)
- Node with two children (`70`)

4. Pre-order and Post-order Traversal Implementation
Input: Using the BST from above, perform pre-order and post-order traversals.
Expected Output:

- Pre-order: `50 30 20 40 70 60 80`
- Post-order: `20 40 30 60 80 70 50`

5. Handling Duplicate Values in BST
Input: Insert values `25`, `15`, `25`, `10`, `20`, `25` into an empty BST.
Task: Show how duplicates are handled (e.g., ignoring, counting, or allowing duplicates on a specific side).

6. Write a function to convert a binary tree into its mirror image. The mirror of a binary tree is obtained by swapping the left and right children of all nodes.