**✅ THEORY**

A **Binary Search Tree (BST)** is a type of binary tree where each node has at most two children and satisfies the **BST property**:

* Left child contains only nodes with values **less than** the parent node.
* Right child contains only nodes with values **greater than or equal to** the parent node.

**🌳 Key Operations in BST:**

1. **Insertion**:
   * Starting from the root, recursively go to the left subtree if the value is less, or to the right if greater or equal.
   * Insert the new node where the left or right child is NULL.
2. **In-order Traversal**:
   * Traverses the tree in Left → Root → Right order.
   * For BSTs, this yields values in sorted order.
3. **Tree Height**:
   * Longest path from the root node to a leaf node.
   * Recursively compute the height of left and right subtrees, and take the maximum.
4. **Minimum Value**:
   * The leftmost node in a BST has the minimum value.
5. **Mirror Tree**:
   * Swap left and right children recursively for each node.
6. **Search Operation**:
   * Compare the key with the current node.
   * If equal, the key is found.
   * Otherwise, recurse left or right depending on the comparison.

**🔃 ALGORITHM**

**1. Insert a Node**

vbnet

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FUNCTION insert(root, key):

IF root is NULL:

RETURN new Node(key)

IF key >= root.data:

root.right = insert(root.right, key)

ELSE:

root.left = insert(root.left, key)

RETURN root

**2. In-order Traversal**

scss

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FUNCTION inorder(root):

IF root is NULL:

RETURN

inorder(root.left)

PRINT root.data

inorder(root.right)

**3. Compute Height**

scss

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FUNCTION height(root):

IF root is NULL:

RETURN 0

left\_height = height(root.left)

right\_height = height(root.right)

RETURN 1 + MAX(left\_height, right\_height)

**4. Find Minimum Value**

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FUNCTION minimum(root):

WHILE root.left is not NULL:

root = root.left

RETURN root.data

**5. Mirror the Tree**

scss

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FUNCTION mirror(root):

IF root is NULL:

RETURN

mirror(root.left)

mirror(root.right)

SWAP root.left AND root.right

**6. Search a Value**

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FUNCTION search(root, key):

IF root is NULL:

RETURN False

IF root.data == key:

RETURN True

ELSE IF key < root.data:

RETURN search(root.left, key)

ELSE:

RETURN search(root.right, key)

