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**Section: 3A**

**Subject: AI LAB**

**DOCUMENTATIONS:**

## Task 1: Depth-First Search (DFS) Using Stack & Node

**Code Explanation:**

1. **Node Class:**
   * Represents a graph node with a value and a list of neighbors (adjacent nodes).
2. **DFS\_use\_stack(start\_node) Function:**
   * Implements **Depth-First Search (DFS)** using a **stack** (LIFO).
   * Initializes a stack with start\_node and an empty visited set.
   * Pops a node from the stack and processes it **if not already visited**.
   * Pushes the **unvisited neighbors** onto the stack (in reverse order for correct traversal).
3. **Graph Construction:**
   * Creates five nodes (node\_0 to node\_4).
   * Defines their **neighbors** (connections between nodes).
4. **Execution:**
   * Calls DFS\_use\_stack(node\_0) to perform DFS.

**OUTPUT:**

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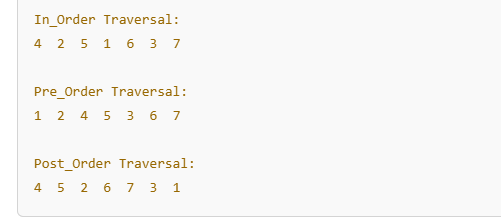
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**Task 2: DFS - Inorder, Preorder, and Postorder Traversals:**

**Code Explanation:**

1. **Tree\_Node Class:**
   * Represents a **binary tree node** with a value, left child, and right child.
2. **Tree Traversal Functions:**
   * **In\_order(root)** (Left → Root → Right)
   * **Pre\_order(root)** (Root → Left → Right)
   * **Post\_order(root)** (Left → Right → Root)
3. **Tree Construction:**
   * Creates a binary tree with 1 as the root and 2, 3, 4, 5, 6, 7 as children.
4. **Execution:**
   * Calls all three traversal functions and prints their respective outputs.

**OUTPUT**:



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