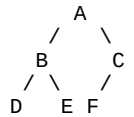
1. Definition of Tree

A tree is a non-linear data structure used to store data in a hierarchical manner. It consists of nodes connected by edges. The topmost node is called the root node. Each node can have zero or more child nodes. Nodes that do not have any children are called leaf nodes. Trees are used to represent relationships where one element is connected to many elements in a structured form.

2. Binary Tree with Six Child Nodes

A binary tree is a tree in which each node can have at most two children called left child and right child. Below is a simple representation of a binary tree with six child nodes.



4. Degree of a Tree

The degree of a tree refers to the maximum number of children that any node in the tree can have. The degree of a node is the number of children it has. The degree of the entire tree is the highest degree among all nodes. This concept helps in classifying trees and understanding their structure.

5. Representation of Tree

Trees can be represented in different ways in memory. One common method is linked representation, where each node contains data and pointers to its child nodes. Another method is sequential representation, where nodes are stored in an array. Tree representation helps in efficient storage, traversal, and manipulation of hierarchical data.

6. Applications of Tree

Trees are widely used in computer science. They are used to represent hierarchical data such as file systems and organization structures. Trees are used in databases, searching techniques, artificial intelligence, and networking. They help in fast searching, sorting, and managing data efficiently.

7. Time Complexity of Binary Search Tree

The time complexity of operations in a binary search tree depends on its structure. In the best case, operations like insertion, deletion, and searching take less time when the tree is balanced. In the worst case, when the tree becomes skewed, these operations take more time. Understanding time complexity helps in selecting efficient data structures for large data handling.