**8.5. TRAVERSING BINARY TREES RECURSIVELY**

Tree traversal is one of the most common operations performed on tree data structures.

It is a way in which each node in the tree is visited exactly once in a systematic

manner. There are three standard ways of traversing a binary tree. They are:

1. Pre Order Traversal (Node-left-right)

2. In order Traversal (Left-node-right)

3. Post Order Traversal (Left-right-node)

**PRE ORDERS TRAVERSAL RECURSIVELY**

To traverse a non-empty binary tree in pre order following steps one to be processed

1. Visit the root node

2. Traverse the left sub tree in preorder

3. Traverse the right sub tree in preorder



**8.5.2. IN ORDER TRAVERSAL RECURSIVELY**

The in order traversal of a non-empty binary tree is defined as follows :

1. Traverse the left sub tree in order

2. Visit the root node

3. Traverse the right sub tree in order

In order traversal, the left sub tree is traversed

The in order traversal of a binary tree in Fig. 8.12 is D, B, H, E, I, A, F, C, J, G.

**POST ORDER TRAVERSAL RECURSIVELY**

The post order traversal of a non-empty binary tree can be defined as :

1. Traverse the left sub tree in post order

2. Traverse the right sub tree in post order

3. Visit the root node

The post order traversal of a binary tree in Fig. 8.12 is D, H, I, E, B, F, J, G, C, A

1. *Traverse the given tree using Inorder, Preorder and Postorder traversals.*

Given tree:

* Inorder : D H B E A F C I G J
* Preorder: A B D H E C F G I J
* Postorder: H D E B F I J G C A

1. *A binary tree with 20 nodes has null branches?*

21

Let us take a tree with 5 nodes (n=5)

Null Branches

1. *How many different trees are possible with 10 nodes ?*

1014

For example, consider a tree with 3 nodes(n=3), it will have the maximum combination of 5 different (ie, 23 - 3 = 5) trees.

i ii iii iv v

In general:

*If there are* ***n*** *nodes, there exist* ***2n-n*** *different trees.*