Binary Trees

Learn, Vid, Fun...

www.gatevidyalay.com
Tree traversal:

Tree traversal refers to the process of visiting each node in a tree data structure exactly once.
Tree

Traversal Techniques

Depth First Traversal
i) Preorder Traversal
ii) Inorder Traversal
iii) Postorder Traversal

Breadth First or Level Order Traversal
I) Preorder Traversal:

Algorithm:

i) Visit the root

ii) Traverse the left subtree i.e. call Preorder (left subtree)

iii) Traverse the right subtree i.e. call Preorder (right subtree)

Remember:

Root → Left → Right
Example:

Binary Tree

Preorder Traversal: A B D E C F G
Shortcut for Preorder Traversal:

Just traverse the entire tree starting from the root node keeping yourself to the left.

\[ \text{Preorder Traversal} = A \ B \ E \ C \ F \ G \]
II) **In order traversal:**

**Algorithm:**

1. Traverse the left subtree i.e. call *Inorder* (left-subtree)
2. Visit the root
3. Traverse the right subtree i.e. call *Inorder* (right-subtree)

**Remember:**

Left → Root → Right
Example:

Inorder Traversal: O B E A F C G
Shortcut for Inorder Traversal:

Just keep a plane mirror horizontally at the bottom of the tree and take the projection of all nodes.

\[ \text{Inorder Traversal} = D \ B \ E \ A \ F \ C \ G_1 \]
iii) Postorder Traversal:

Algorithm:

i) Traverse the left subtree i.e. call Postorder (left subtree)

ii) Traverse the right subtree i.e. call Postorder (right subtree)

iii) visit the root

Remember:
Left → Right → Root
Example:

```
Binary Tree
```

Postorder Traversal: DEBFGCA
Shortcut for Postorder Traversal:

Just pick the leftmost leaf nodes one by one.

Postorder Traversal: D E B F G C A
iv) Level Order Traversal:

- Level Order Traversal of a tree is the breadth-first traversal of a tree which prints all the nodes of a tree level by level.

- Example:

```
Level order Traversal:
A B C D E F G
```
Important Points for exam:

- Preorder traversal is used to get prefix expression of an expression tree.
- Inorder traversal is used to get infix expression of an expression tree.
- Postorder traversal is used to get postfix expression of an expression tree.
- Preorder traversal is used to create a copy of the tree.
- Postorder traversal is used to delete the tree.
- Level order traversal prints the data in the same order as it is stored in the array representation of complete binary tree.