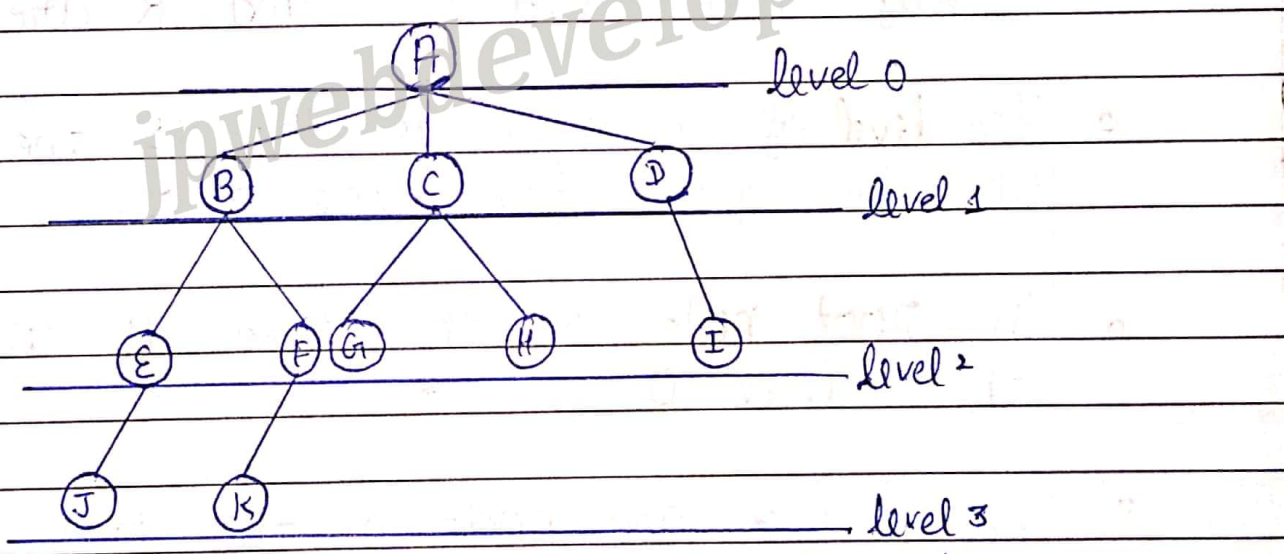
#Data Structure Notes. __/__/____

(TREE)

- A tree is a collection of nodes. The collection can be empty, which is sometimes denoted as A.
- A tree is a hierarchical data structure defined as a collection of nodes
- It is a non-linear data structure because it does not store in sequential manner.



→ In the Tree data structure, the top most node is known as root node. Each node contains some data, and data can be of any type.

- Here "A" is root node and A, B, C, D, E, F, G, H, I, J, k are called nodes.

__/__/____

- The subset to the left of the "root" node is called left sub tree and nodes to the right of the "root" are called right sub tree.

Key Points :-

- Each element in a tree is called as a "node".
- A node with no sub tree is called the "leaf" node. G, H, I, J and K are leaf node.
- The level of a node is the is the lenegth or the path from the root.
- The root node of the tree is always at the level 0.
- The level of any node in the tree is one more than the level of its father.
  example - B, C, D are at level 1, nodes E, F, G, H, I are at level 2 and nodes J, K are at level 3.
- Depth or height of a tree is the maximum level of any node in that tree.

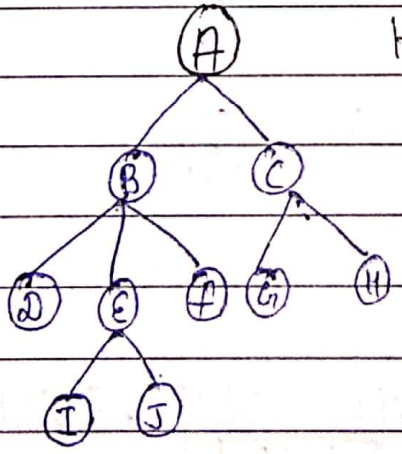
- ancestors :- Parents and Grandparents of the nodes are called the ancestors.
- descendant :- children of a node and children of these children.
- The link that joins the Parent to its child is known as a edge.

* TREE TERMINOLOGY :-

In tree data structure, we use the following terminology :-

1. Root :-

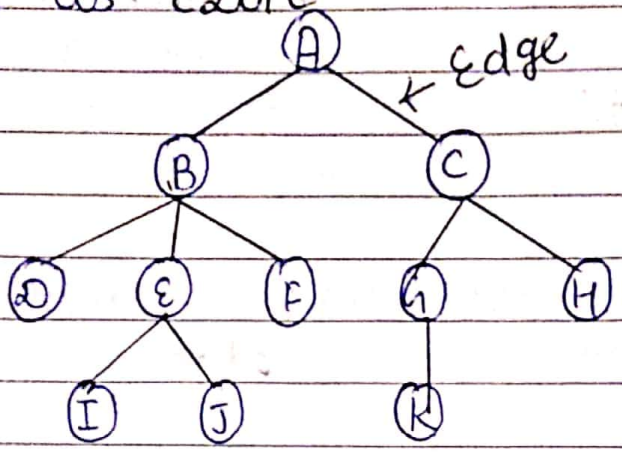
In a tree data structure, the first node is called as Root node. Every tree must have a root node.



Here 'A' is the 'root' node.

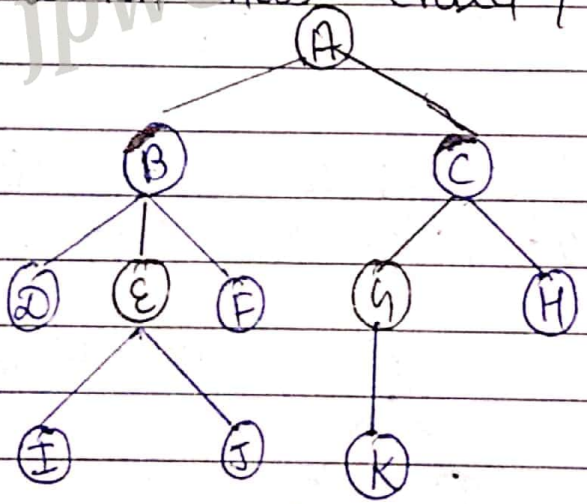
2. Edge :- In a tree data structure, the connecting link between any two node

is called as EDGE.



3. Parent :-

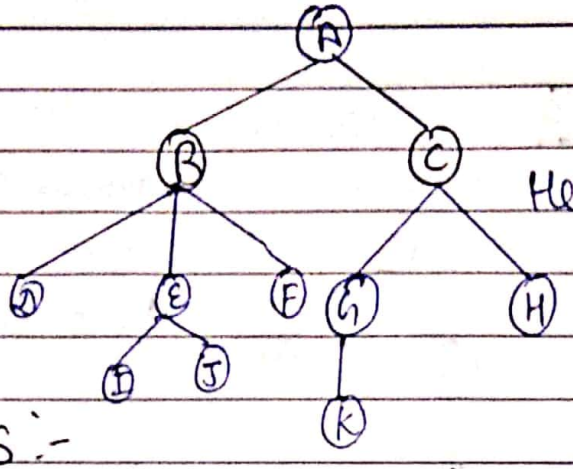
- The node which is a Predecessor of any node is called as PARENT NODE.
- Parent node can also be defined as " The node which has child / children.



Here A, B, C, E, G are Parent node

(4) Child :-

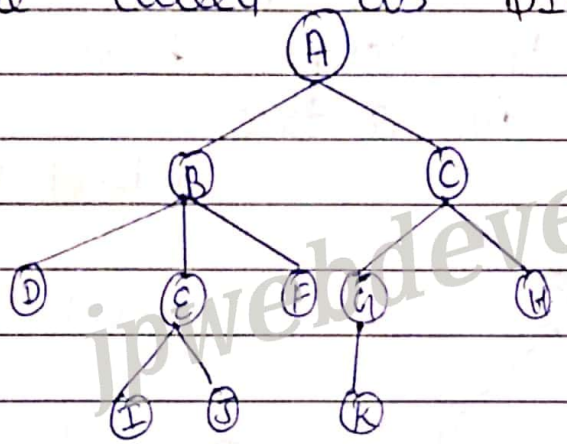
- The immediate successor of the node is its [child]
- In Binary tree a node have at max two children



Children
Here B, C are of A.
Here G, H are children of C.
Here K is child of G.

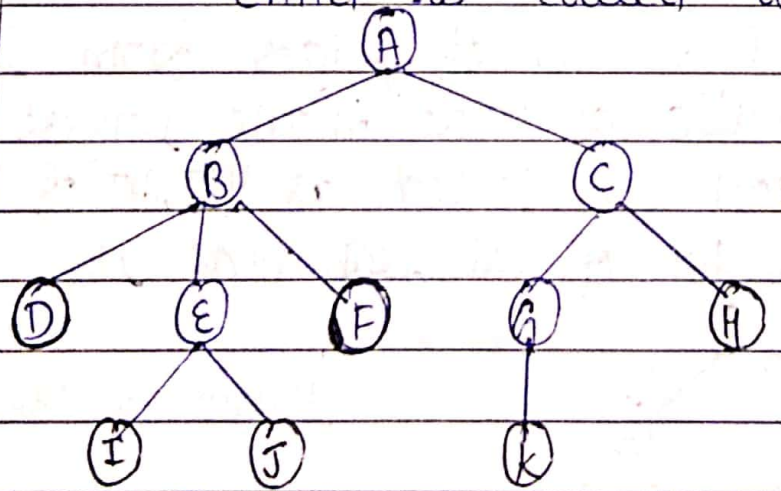
(5) Siblings :-

The node which belong to same Parent are called as SIBLINGS.



Here B and C are Siblings
Here D, E and F " "
Here G and H " "
Here I and J " "

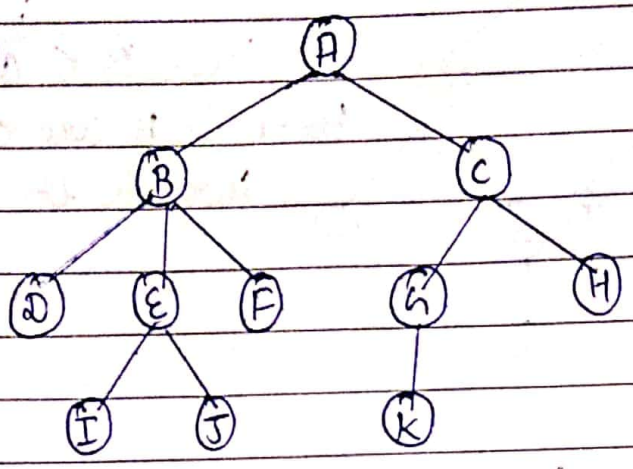
(6) Leaf :- The node which does not have a child is called as LEAF Node.



Here D, I, J, F, K and H are leaf nodes

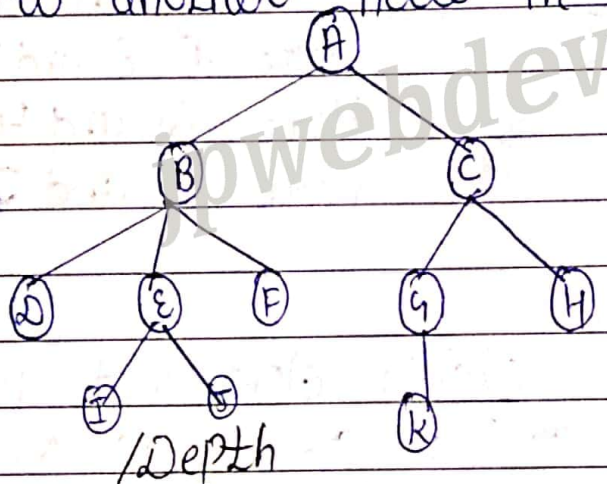
(7) Degree :- The total number of children of a node is called DEGREE.

(8)



Here Degree of B is 3
Here Degree of A is 2
Here Degree of F is 0

(9) Level :- It is always an integer value which measures the distance from one node to another node in a tree.

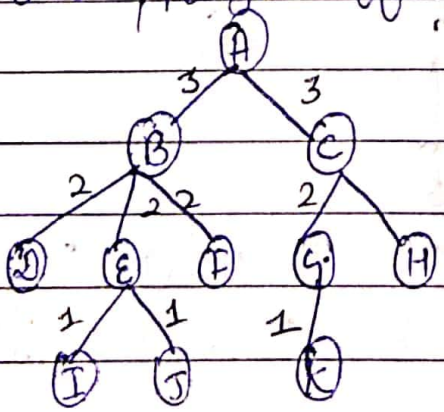


→ level 0
→ level 1
→ level 2
→ level 3

/Depth

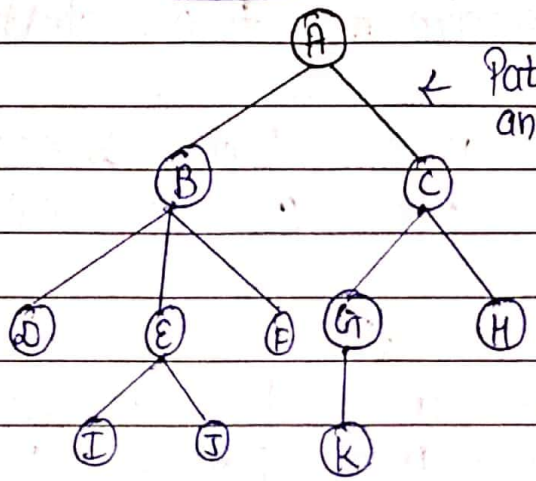
(10) Height :- The total number of edges from leaf node to a particular node in the longest node in the longest path is called as HEIGHT of that node.

- In a tree, height of all leaf node is '0'.



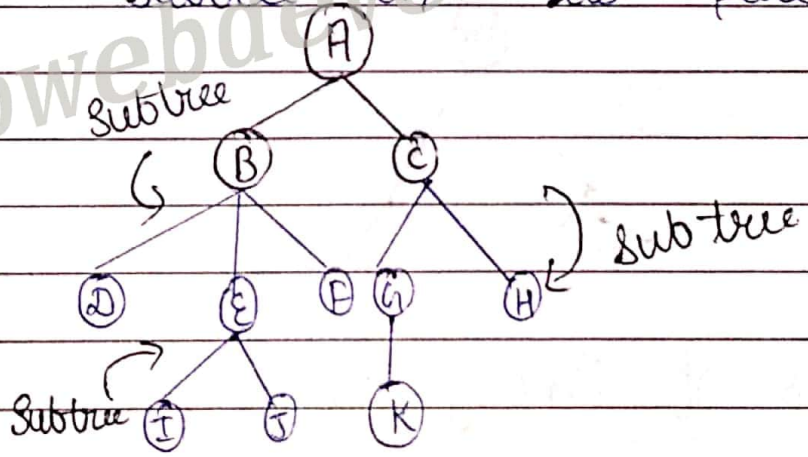
Height of tree is 3.

(12) Path :- The sequences of Nodes and Edges from one node to another node is called as PATH between that two nodes



← Path is a sequence of nodes and edges between two nodes.

(13) Sub Tree :- Every child node will form a subtree on its parent node.



Left Sub tree and Right Sub tree :- The left and right sub-tree is nothing but the left and the right nodes of the tree.