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2018172

Jaypee University of Engineering and Technology
18B11CI311– Data Structures
B.Tech -3rd Semester
Tutorial – 9 (Tree)

1. Consider the following nested representation of binary trees: (X Y Z) indicates Y and Z are the left and right sub stress, respectively, of node X. Note that Y and Z may be NULL, or further nested. Which of the following represents a valid binary tree?
(A) (1 2 (4 5 6 7)) (B) (1 (2 3 4) 5 6) 7) (C) (1 (2 3 4)(5 6 7)) (D) (1 (2 3 NULL) (4 5))

2. Construct a binary tree for the following pre-order and in-order traversals:
In-order sequence: DIBHJEAFLKCGM
Pre-order sequence: ABDIEHJCFKLGM

3. For the obtained Tree in Que-2 , Write the orders of the nodes visited in:
   A. In-order traversal
   B. Pre-order traversal
   C. Post-order traversal

4. What is the result of pre-order traversal of tree whose post-order traversal is : 5,2,10,6,11,12,7,3,8,9,4,1 and in-order is traversal is 5,2,1,10,6,3,11,7,12,8,4,9.

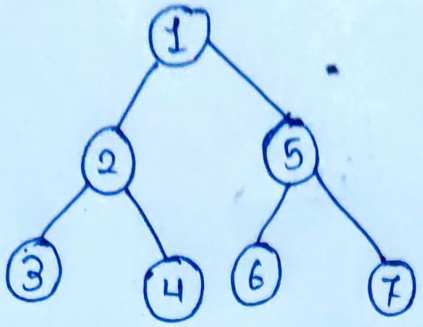
5. The output of in-order and post-order traversal of some binary tree is given, what is the output of its preorder traversal
In-order: c a f h g i e b d
Post-order: c h i g f e d b a

6. The pre-order traversal of a certain Binary Search Tree (BST) is 10, 5, 3, 2, 15, 12, 20. Construct BST with the help of above pre-order sequence. Perform following operations sequentially on constructed BST (show each step clearly):
(a) Add new node with key value 23
(b) Delete node 10
(c) Delete node 15

7. Draw the Huffman Tree for the following set of tokens:
Eerie eye seen near the lake.

8. Suppose that we have numbers between 1 and 1000 in a BST and want to search for the number 363. Which of the following sequences could not be the sequence of nodes examined?
(A) 2, 252,401,398,330,344,397,363 (B) 924,220,911,244,898,258,362,363
(C) 925,202,911,240,912,245,363 (D) 2,399,387,219,266,382,381,278,363

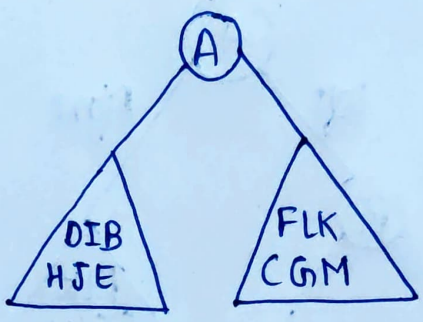
(1) (1(234)(5,67)



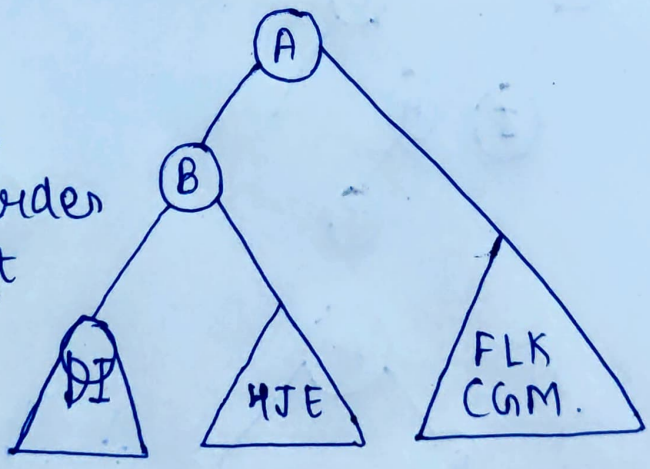
(2) In order Sequence: DIBH J EA FLK C G M

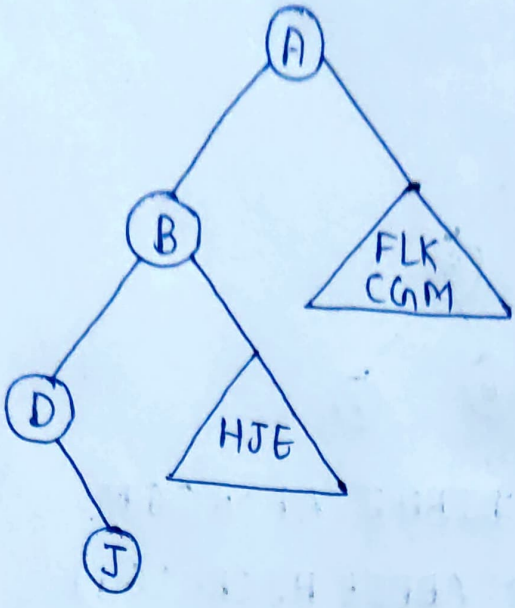
Pre Order Sequence: ABDIE HJ CFKLG M.

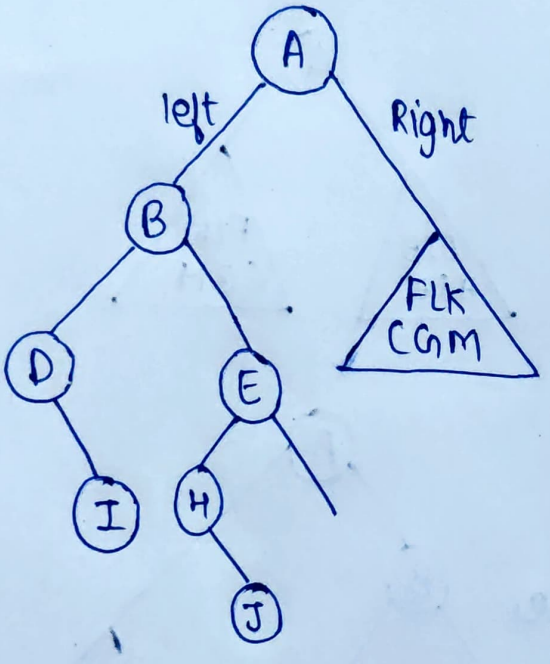
first element of pre order is root

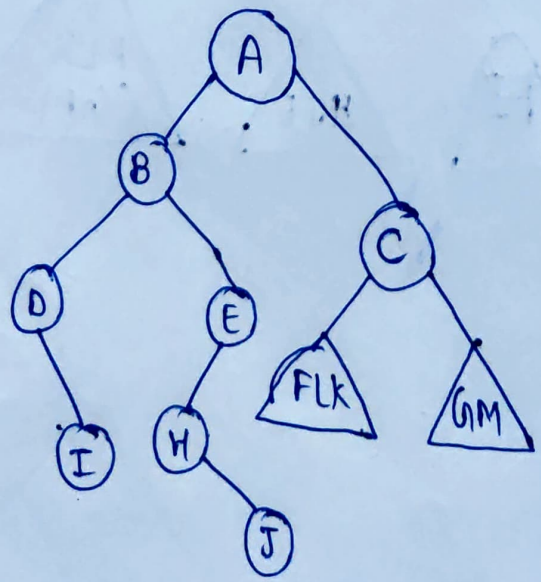


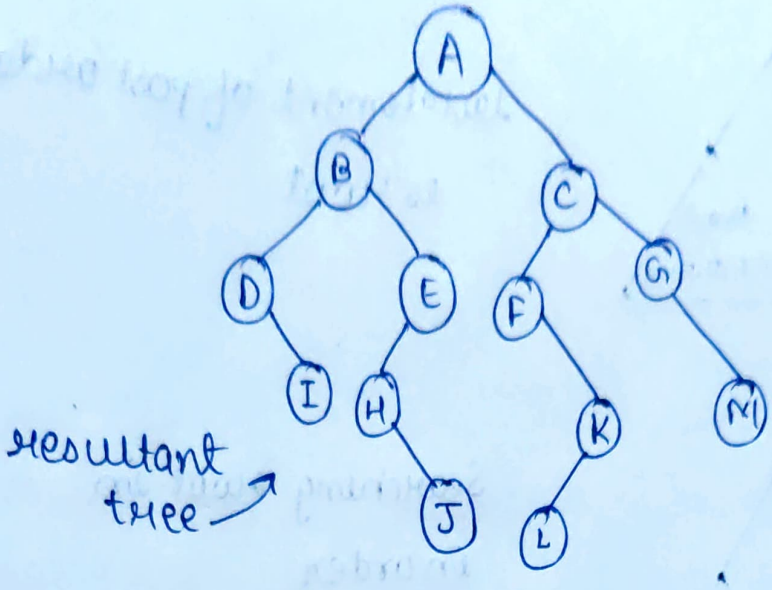
Now for root node in inordere all the elements are coming in left inorder will be there in left subtree similarly for right




A
B
FLK
CGM
D
HJE
J


A
left
Right
B
FLK
CGM
D
E
I
H
J


A
B
C
D
E
FLK
GIM
I
H
J



resultant tree

(3) Using above tree

- In order traversal

  DIBHJEAFLKCGM

- Post order traversal

  IDJHEBLKFMGCA

- Pre order traversal

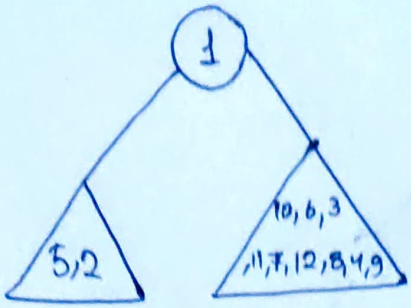
  ABDIEHJCFKLGM.

(4) Post order traversal is :

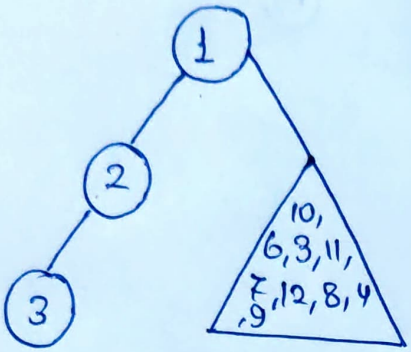
5, 2, 10, 6, 11, 12, 7, 3, 8, 9, 4, 1

In order traversal is

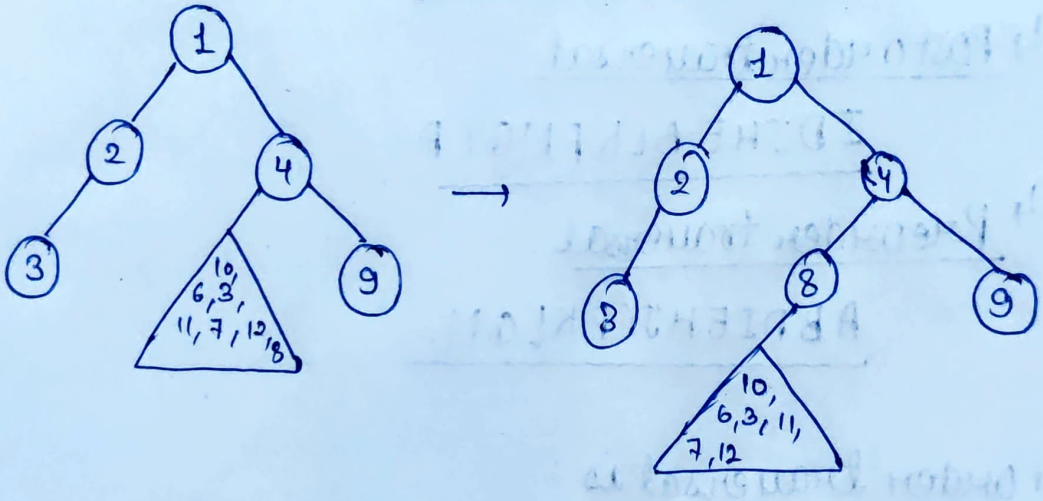
5, 2, 1, 10, 6, 3, 11, 7, 12, 8, 4, 9

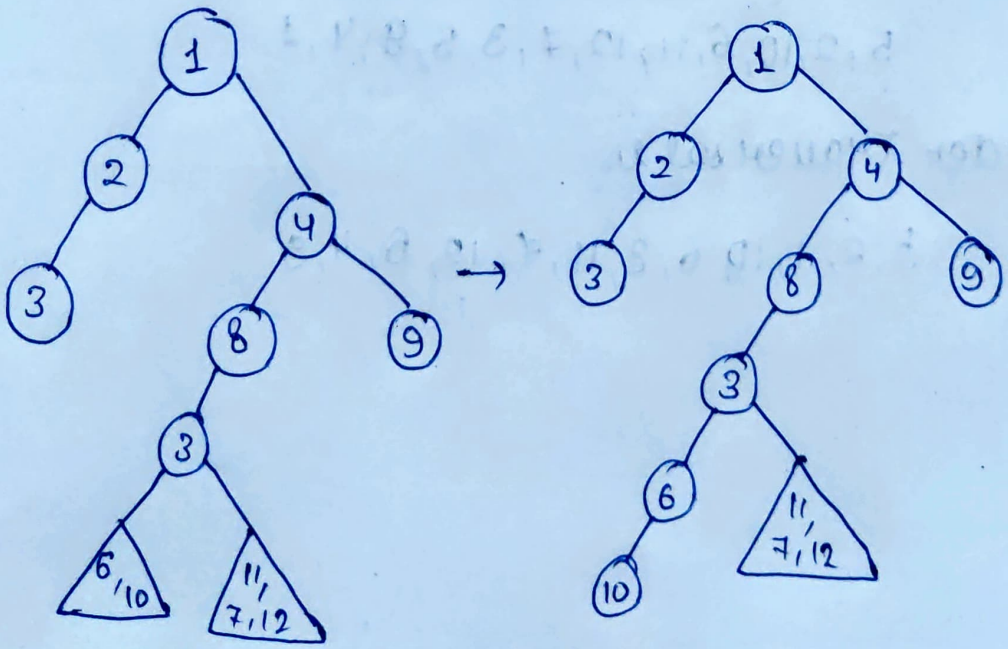


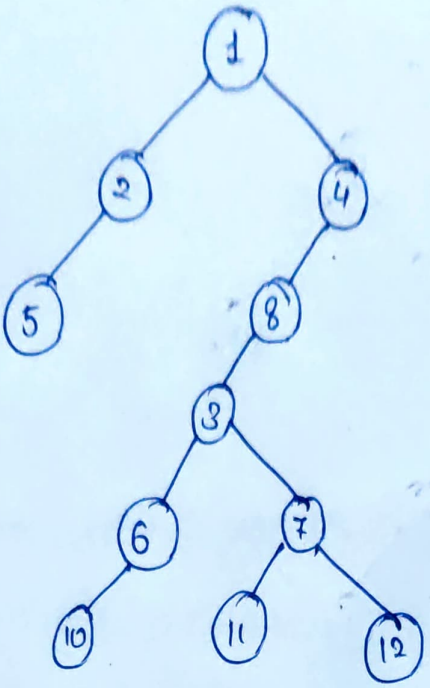
last element of post order is root



Searching root in in order
shift left and right order

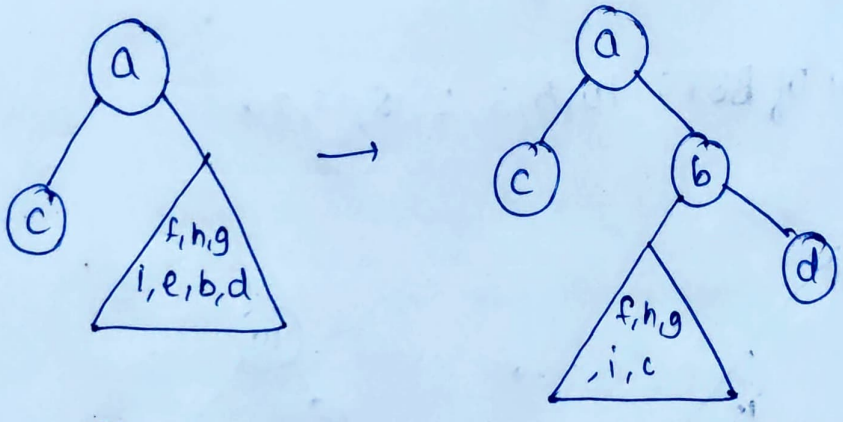


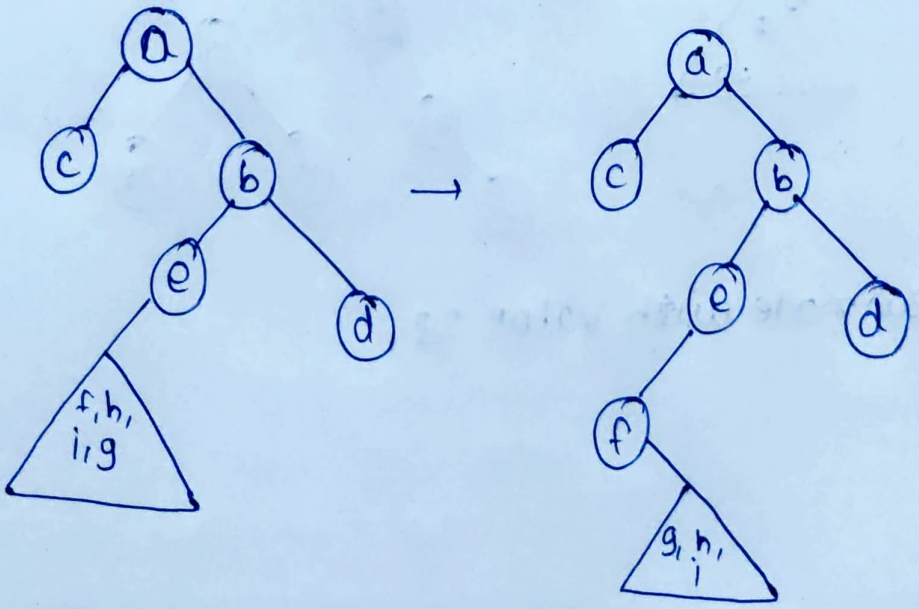


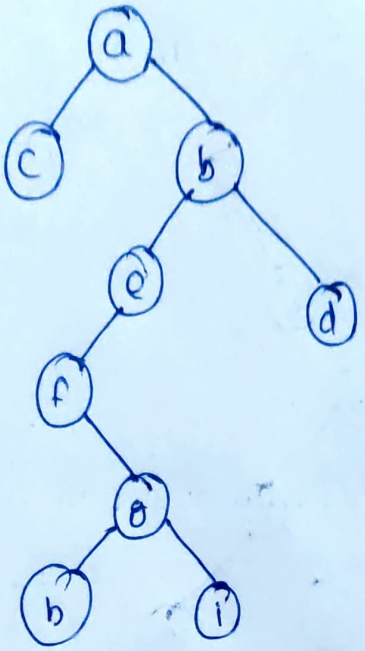


(5) Inorder: c a f h g i e b d

Postorder: c h i g f e d b a.





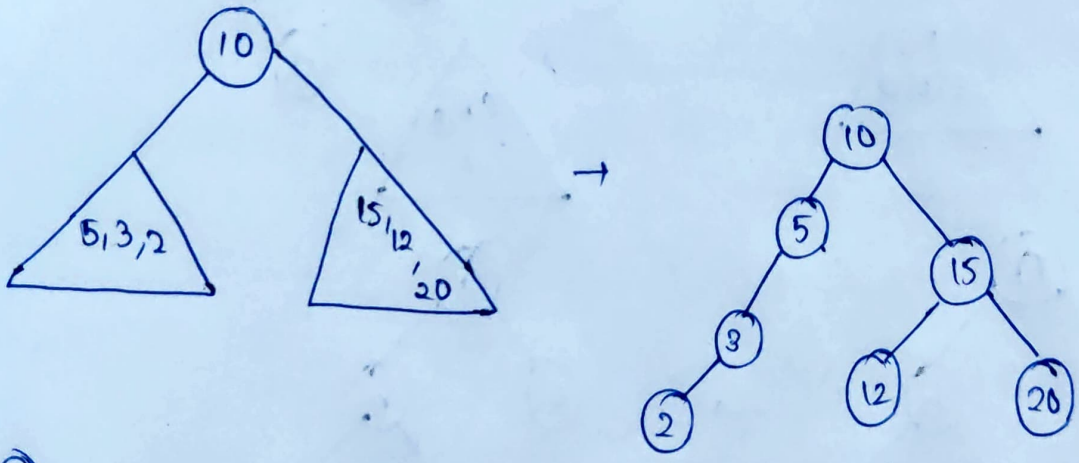


Inorder : cafhgiebd

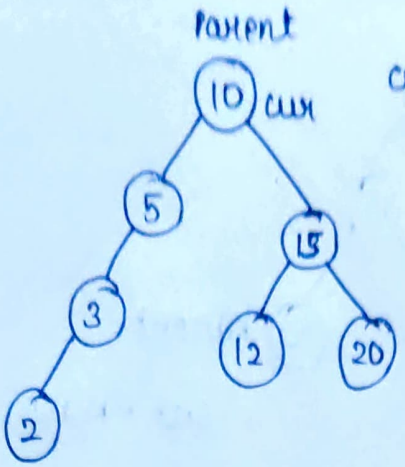
Postorder : chigfedba

Preorder : acbefghid.

(6) Preorder of BST: 10, 5, 3, 2, 15, 12, 20



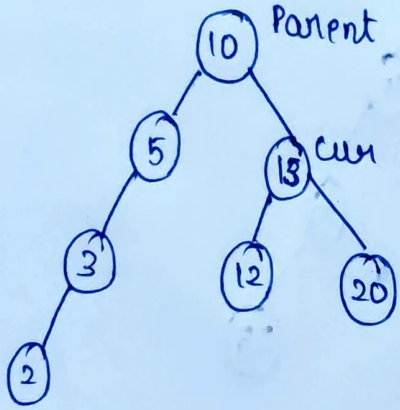
(i) add new node with value 23



currently start or root is pointing here.

Currently root is smaller than 23 i.e key so we have to move in right sub tree.

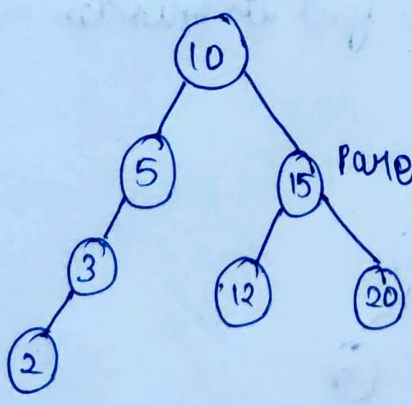
cur = cur → right



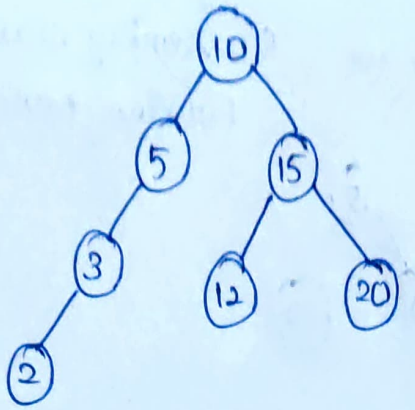
Again same situation

cur = cur → right

parent = parent → right



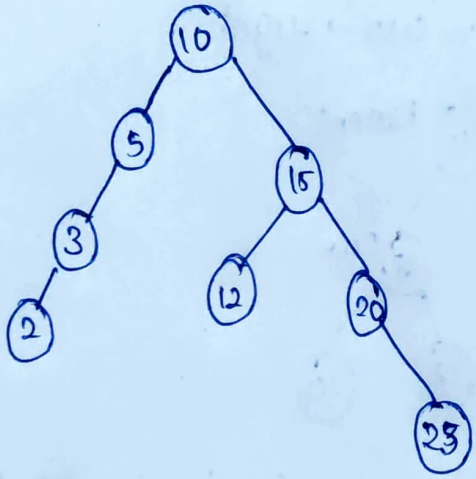
Again same. situation



parent

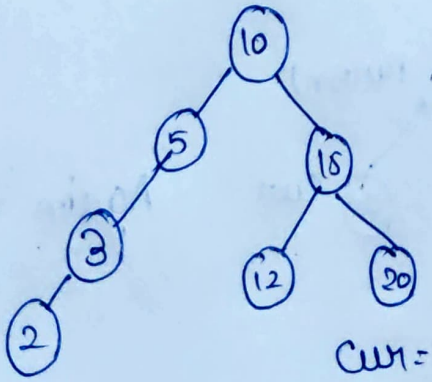
cur = NULL

Now, key is greater, so key will be inserted in the right of parent.



(ii) Now node 10

Since, we have to delete the root with 2 children. so we have to find its inorder successor




```
cur = cur->right
while (cur!=NULL)
    cur = cur->left;
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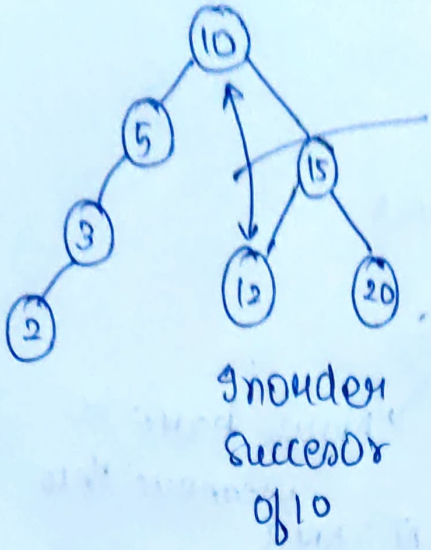
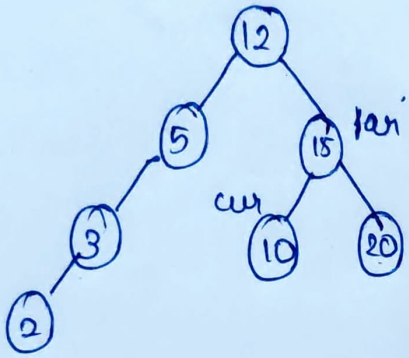


we have to swap the data of root and its inorder successor

Inorder Successor of 10

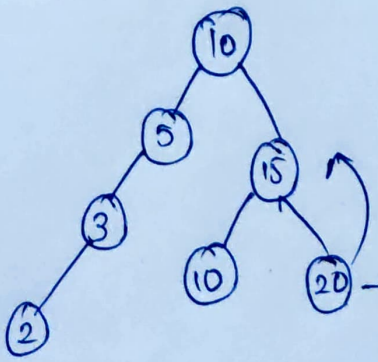
After swapping.



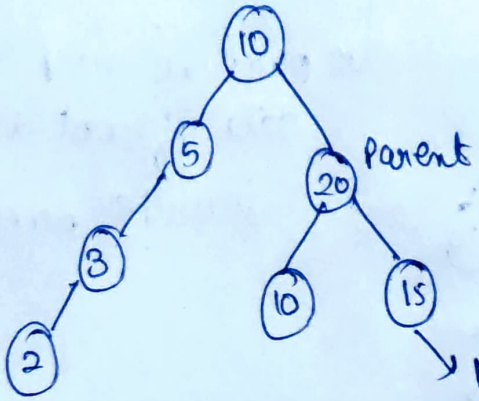
Now we have to delete 10, which have 0 child,
So, the only update is left child of should point to NULL
par→left = NULL.

(c) Delet node 15.

we have to delete node with value 15 having 2 children so we have to find its inorder successor



Swap these values → inorder successor.



parent → right = NULL.