

Binary Search Tree: It has two properties: ①

- (i) Binary Tree means that tree has at most two children. that is 0, 1, or 2 children.
- (ii) The left subtree of any node ~~is~~ ^{will have value} less than that node and right subtree of any node will have value greater than that node.

eg.

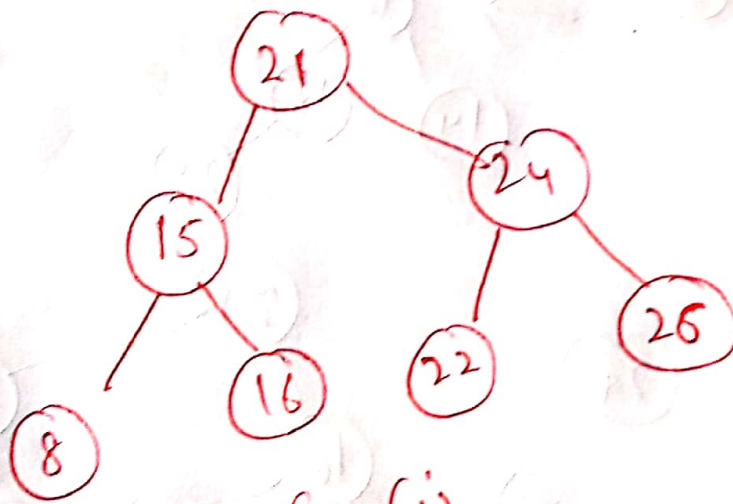
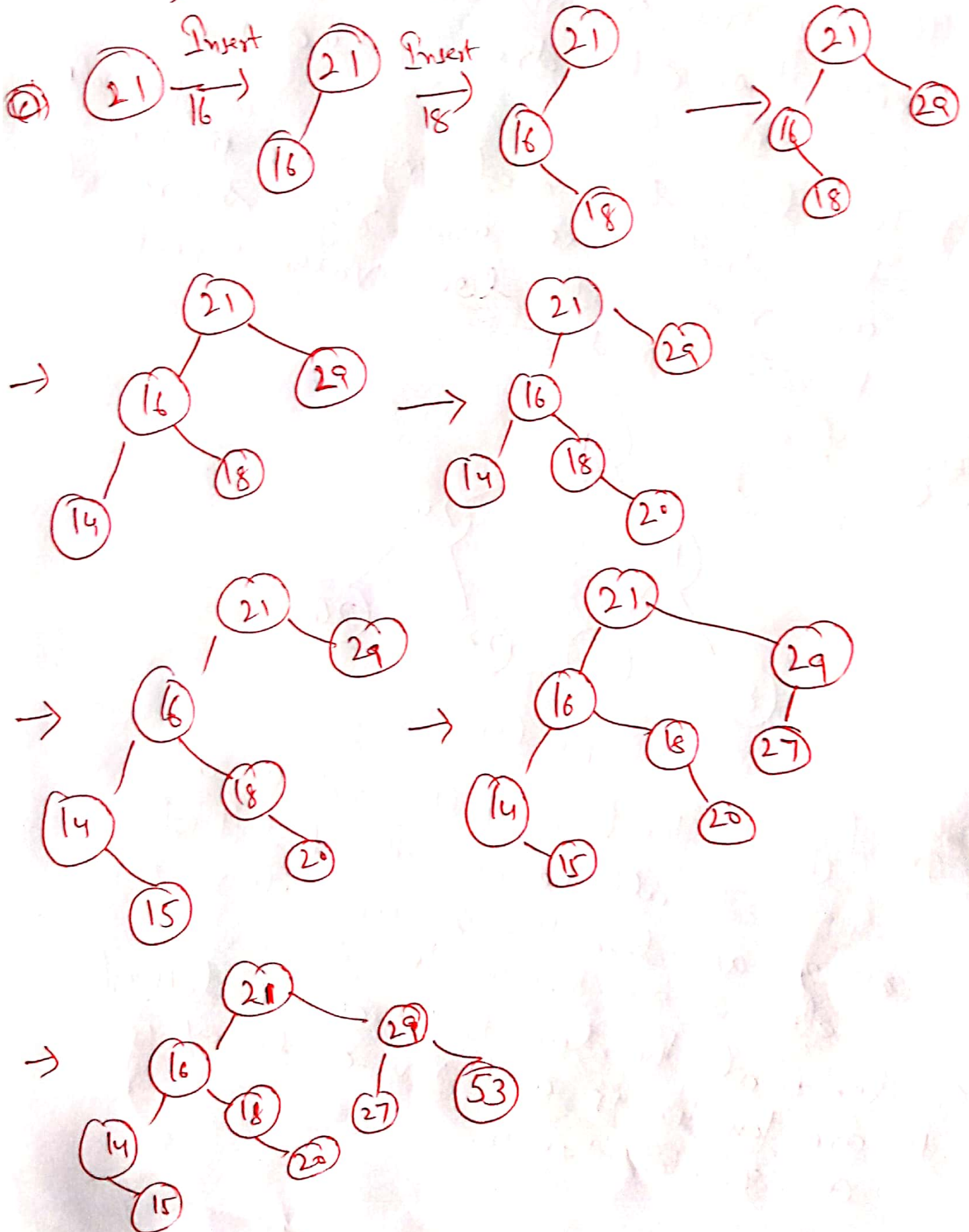


Fig (i)

In fig. (i), the property (i) and (ii) are satisfied. all the elements of left of 21 are less than 21 and its right element are greater than 21. Similarly all the elements which are left of 15 are less than 15 and right child of 15 are greater than 15.

Construction of Binary Search Tree

21, 16, 18, 29, 14, 20, 15, 27, 53 ~~59, 41~~



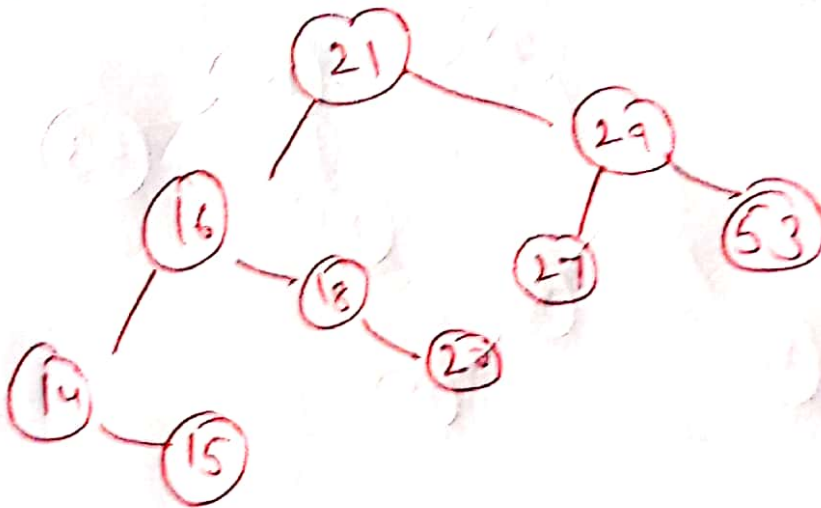
Deletion from a BST

Deletion of a node from a BST

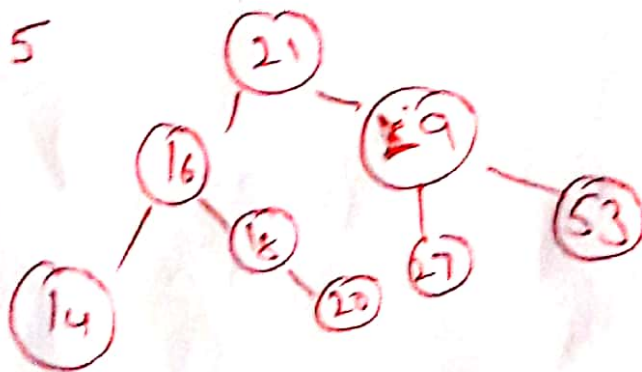
involves three cases:

- (i) The node that we want to delete has zero child
- (ii) The node that we want to delete has only one child
- (iii) The node that we want to delete has two child.

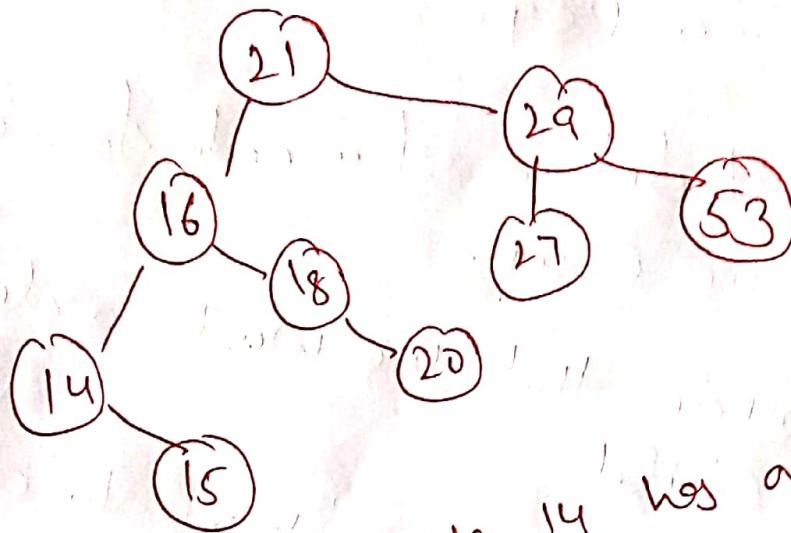
eg.



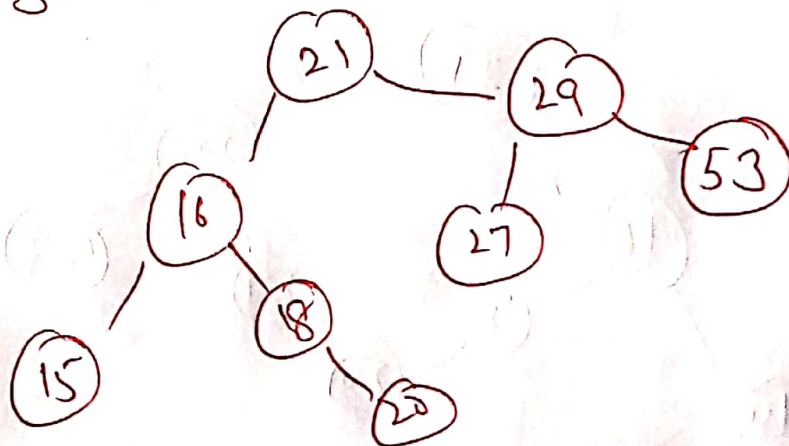
Ex(ii) Delete 15



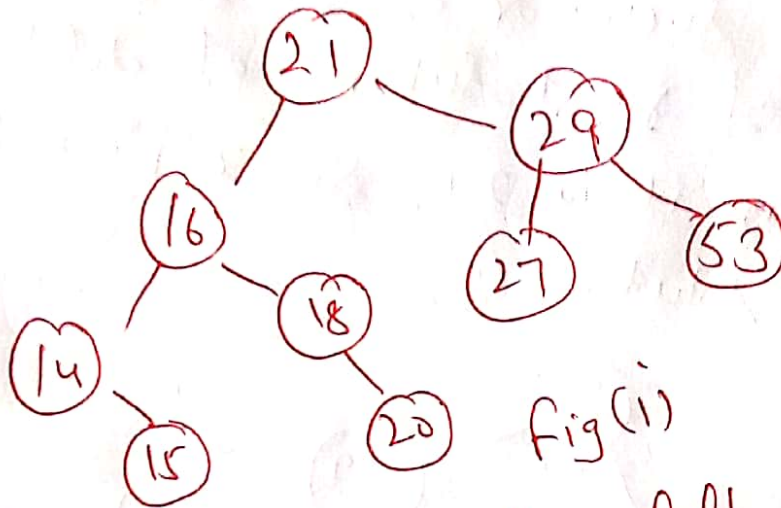
Ques (ii)



Delete 14, since node 14 has only one child.
Solution is that node is replace with
its children either having left child
or right child, in our example right child
is 15. So solution is:



Case III When a node has two child

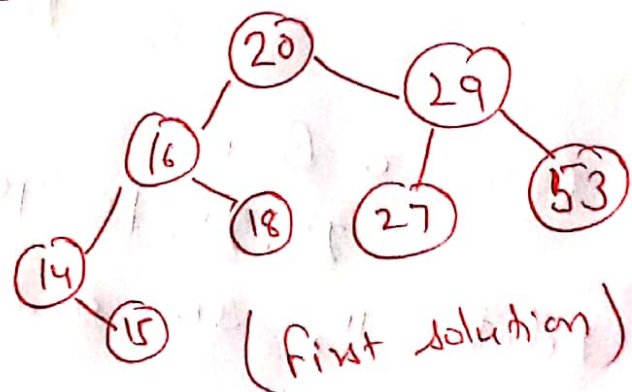


Delete 21, node 21 has left as well as right child.

- Here we have two situations.
- Replace that node with its inorder predecessor.
 - Replace that node with its inorder successor.

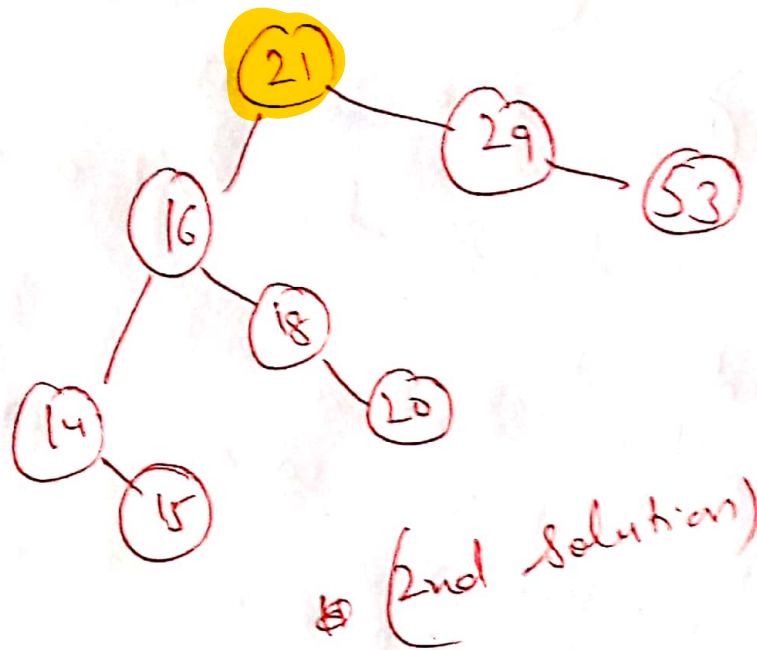
then two BST are formed

Inorder predecessor is the largest element of left subtree of deleted node.
The largest element of left subtree of 21 is 20, so replace 21 with 20 and output will be



2nd situation

In order successor of 21 is the smallest element of right subtree of deleted node
In our case it is 27, So replace 27 with 21 and solution is



Assignment

(i) Construct the BST
11, 6, 8, 19, 4, 10, 5, 17, 43, 49, 31

After Constructing

delete (i) 17

Delete (ii) 4

Delete (iii) 19

Delete (iv) 11

(ii) Create a BST
22, 25, 15, 19, 11, 13, 30, 27, 29, 12, 14, 16
Delete 11, 30 and 29