

AVL TREE

Traversing {
 A. Pre
 B. In
 C. Post-.

1. Binary Tree.

2. Binary Search Tree.

3. Construction of Binary Tree

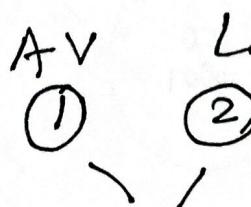
i. Pre In

ii. Post In

iii. Pre Post-.

AVL Tree OR Height-Balanced Tree.

What is full form of AVL ?



2 Mathematician.

+
 Adelson Velski
 Landis

↓
 AVL Tree.

AVL Tree :

1. It is a BST (Binary Search Tree)
 2. We calculate BF (Balance Factor)
- BF (Balance Factor) = Height of Left Subtree
 →
 Height of Right Subtree.

calculation of BF:

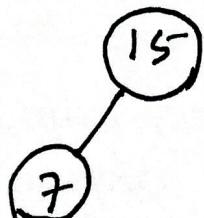
Exp: 01 15

$$(15) \quad BF = \frac{\text{Height of } L_t - \text{Height of } R_t}{\text{Height of left} - \text{Height of right}} = 0 - 0 = 0$$

$$(15) \quad BF = 0 - 0 = 0 \quad \text{OR} \quad BF = 0 \quad \text{OR} \quad 0$$

Exp: 02

15, 7
15. construct BST



For AVL tree:

$$\text{LL=1} \quad BF = 1 - 0 = 1$$

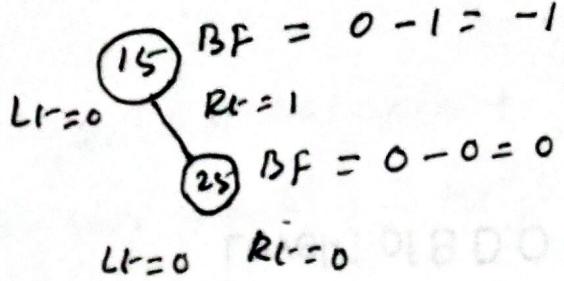
$$RL = 0$$

$$BF = 0 - 0 = 0$$

$$LT = 0 \quad RT = 0$$

Exp: 03

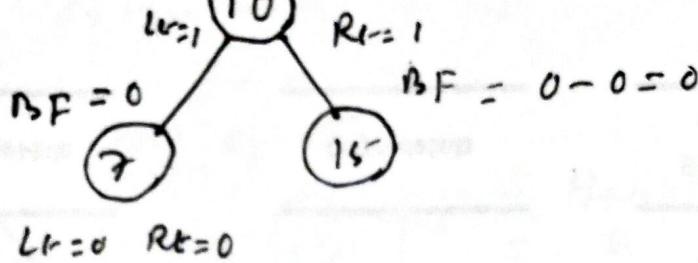
15, 25⁻



Exp: 04

10, 7, 15⁻

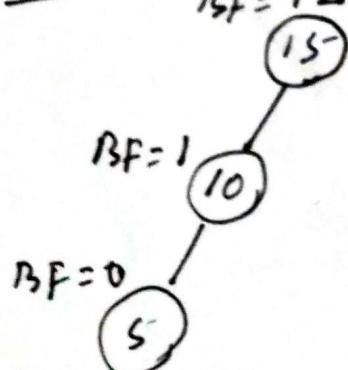
BF = 1 - 1 = 0



Exp:

15⁻, 10, 5⁻

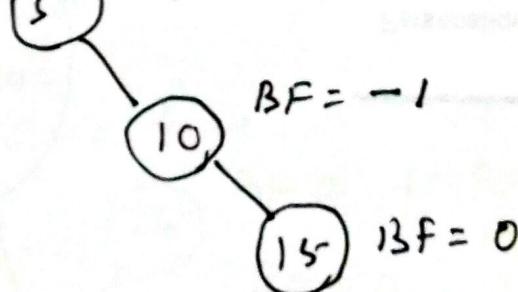
BF = +2 or 2 ✓



Exp:

5⁻, 10, 15⁻

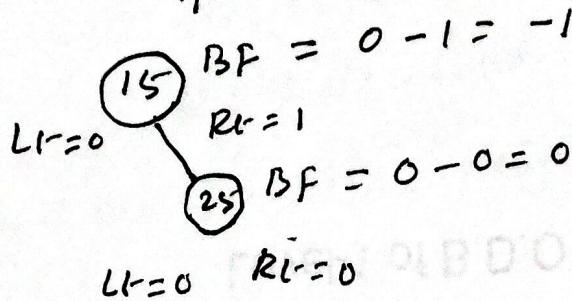
BF = -2 ✓



Note: If the Balance factor
is +2 or -2 it takes
a Rotation.

Exp: 03

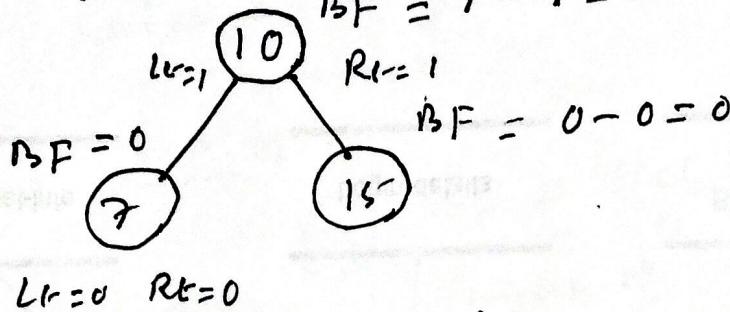
15, 25



Exp: 04

10, 7, 15-

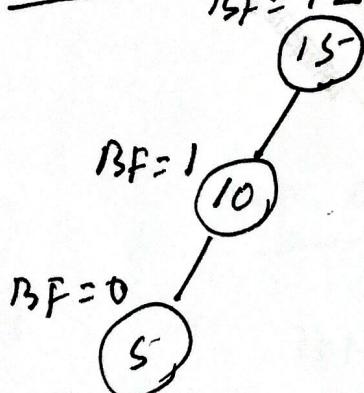
$$BF = 1 - 1 = 0$$



Exp:

15-, 10, 5-

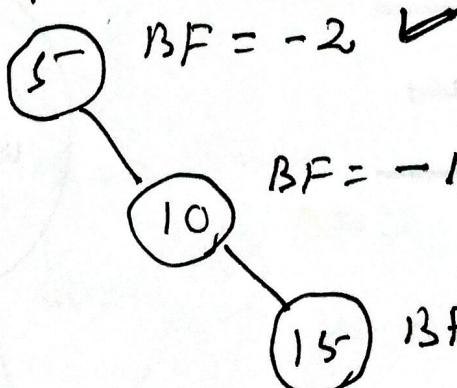
$$BF = +2 \text{ or } -2$$



Exp:

5-, 10, 15-

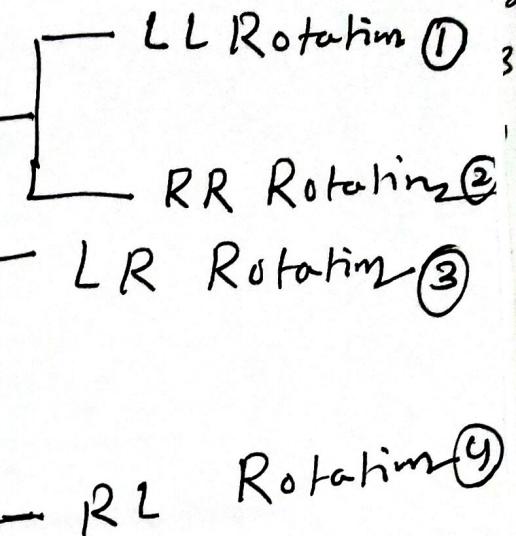
$$BF = -2$$



Note: If the Balance factor
is $+2$ or -2 it takes
a Rotation.

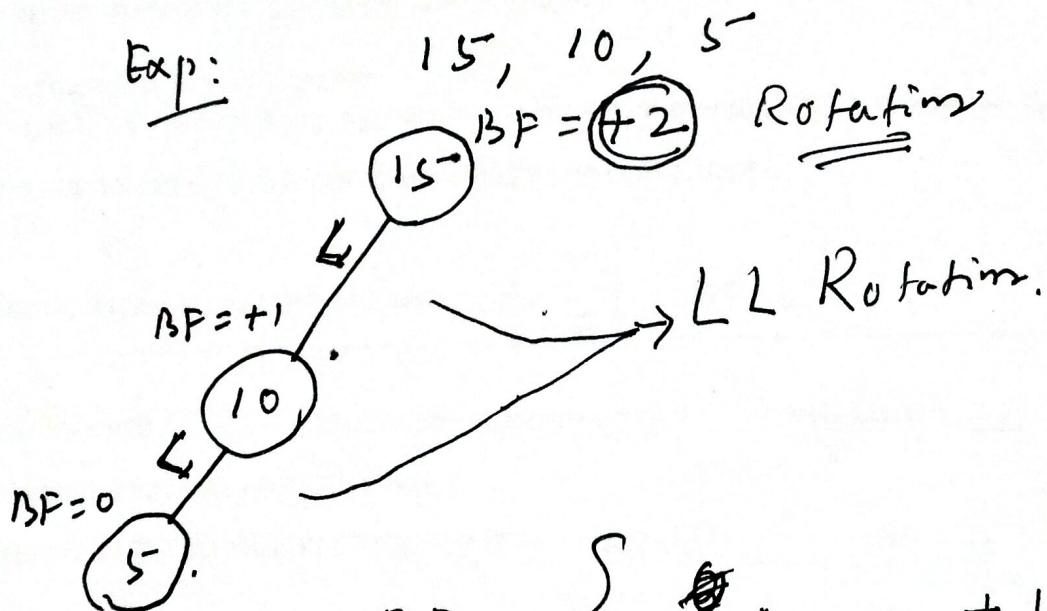
Rotation In AVL Tree:

- In AVL tree, there are 4 types of rotations
1. Single Rotation
 2. Double Rotation



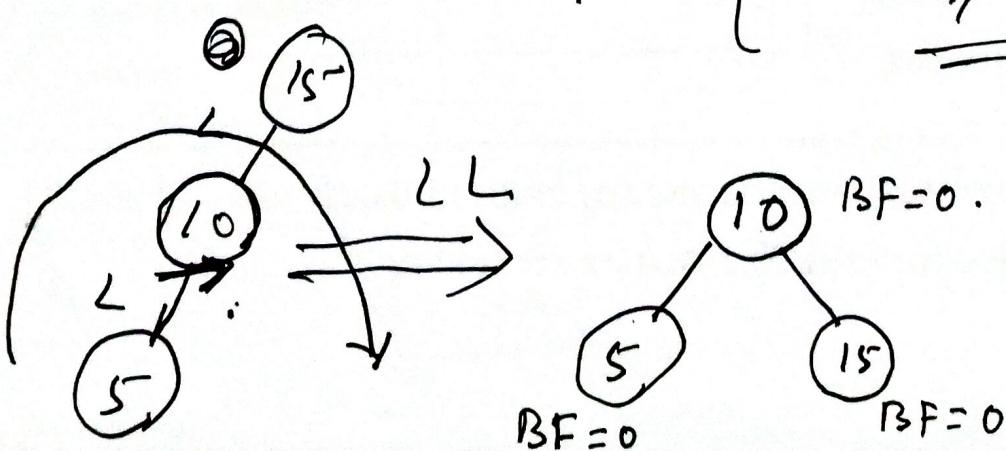
LL Rotation: Left subtree of Left subtree (L) : LL Rotation.

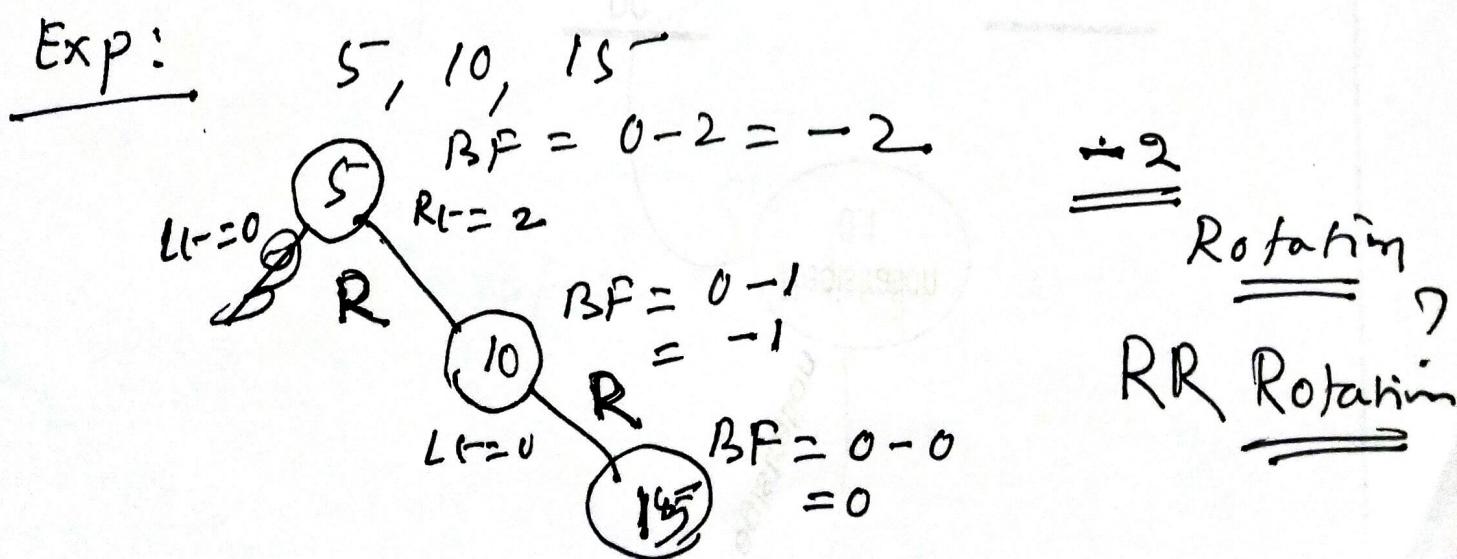
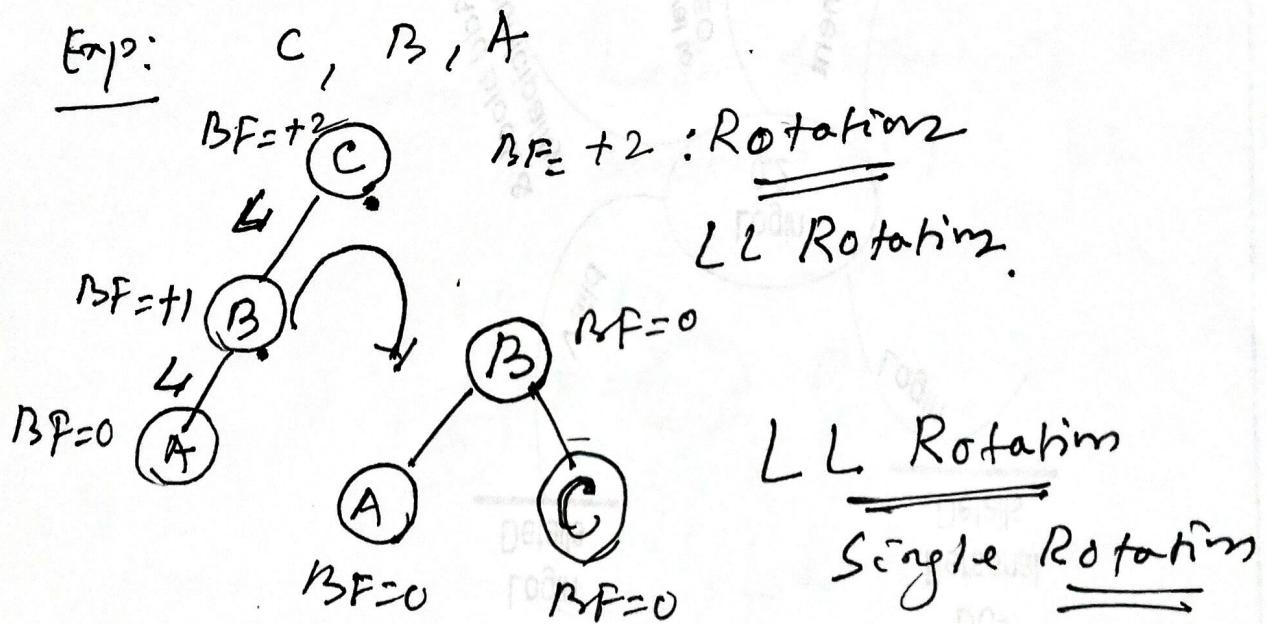
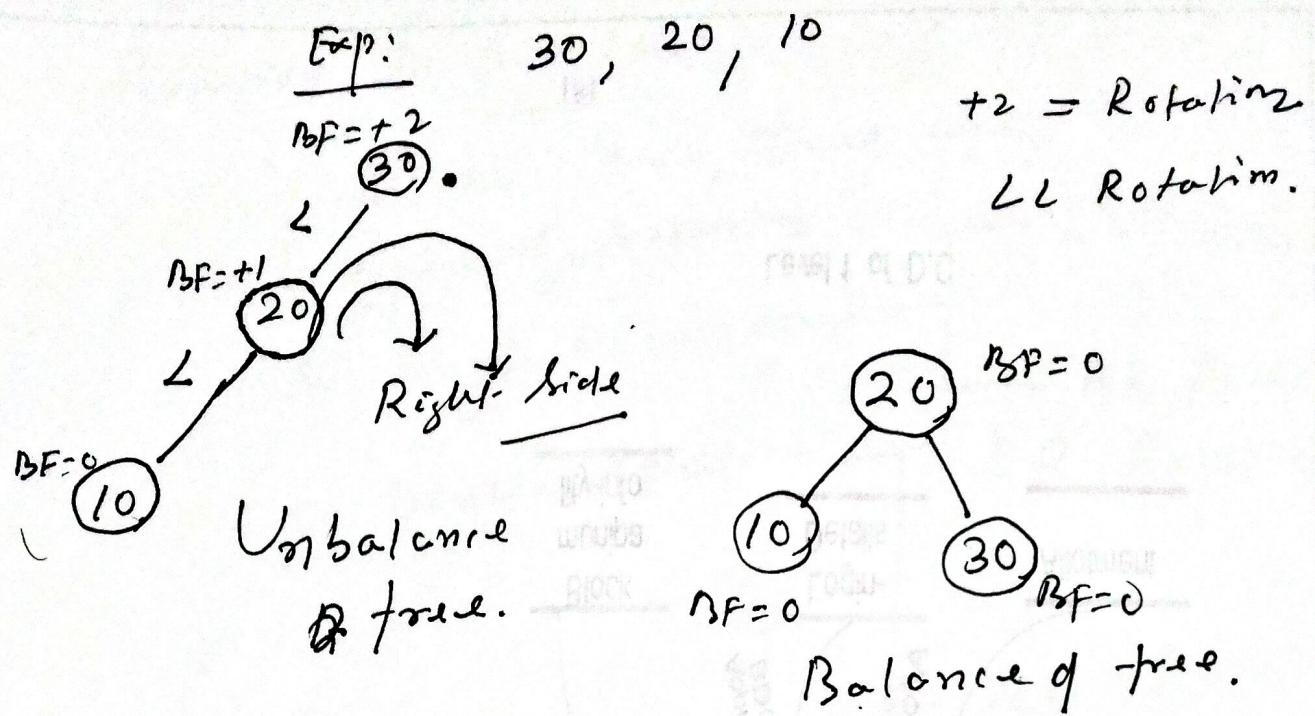
Ex:

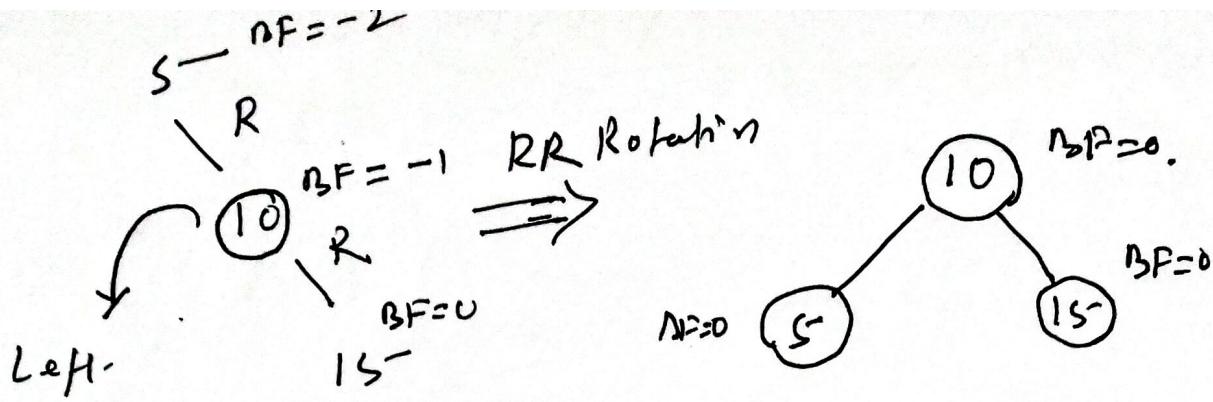


$$BF = \{ -1, 0, +1 \}$$

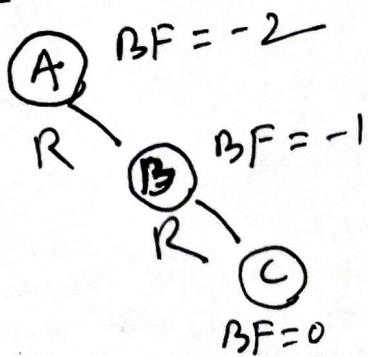
AVL tree =



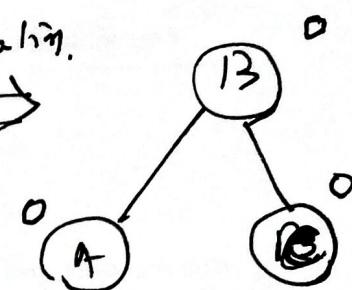




Exp: 02 A, B, C

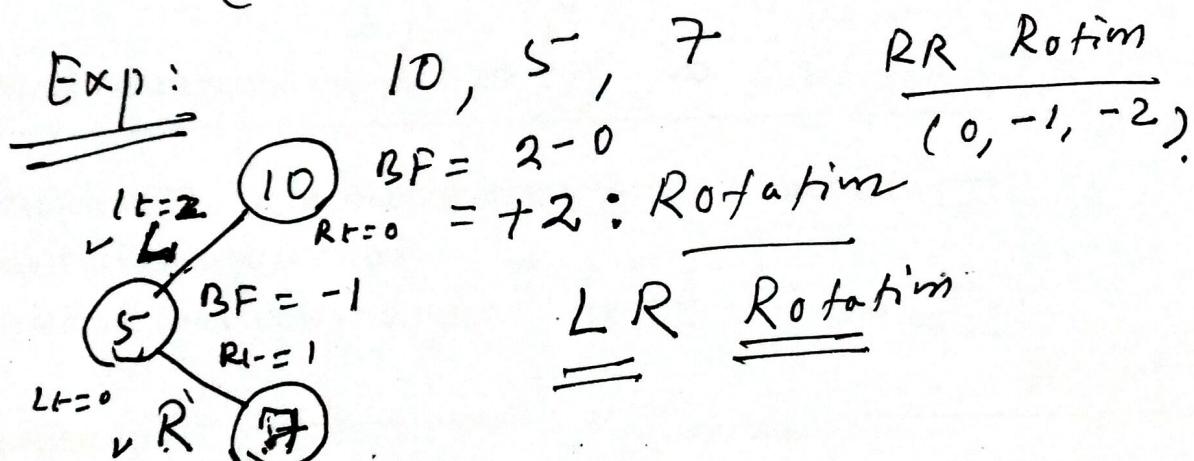


RR Rotation.



Single Rotation {
 1. LL Rotation
 2. RR Rotation.

LL Rotation
 $(0, +1, +2)$



Exp: 15, 25, 30, 20 RR Rotation

