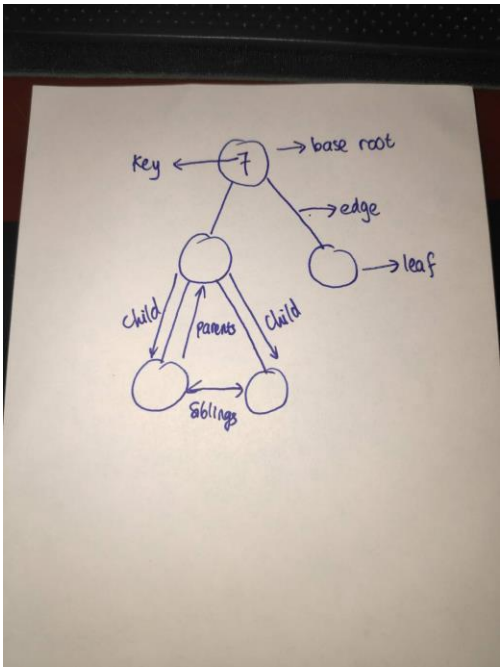
1. Explain the differences between linear and non-linear data structures!

In linear data structure, data elements are sequentially connected and each element is traversable through a single run.

In non-linear data structure, data elements are hierarchically connected and are present at various levels.

2. Describe the following terminology in a tree: base root, key, edge, siblings, parent, child, and leaf!



3. Explain the following types of binary trees: full, complete, and perfect!

full = a Binary Tree is a full binary tree if every node has 0 or 2 children.

complete = Binary Tree is complete if all the levels are completely filled except possibly the last level and the last level has all keys as left as possible.

perfect = Perfect Binary Tree in which all the internal nodes have two children and all leaf nodes are at the same level.

4. What makes a tree balanced?

if the difference level or height between left subtrees and right subtrees less or equal to one.

5. Explain the four properties of a binary tree!

max nodes at k level = 2^k

max nodes in a tree = 2^(k+1)-1

min levels or heights (with n nodes) = 2log(n)

max levels or heights (with n nodes) = n-1

6. Explain the intuition of implementing a binary tree using an array!

index for left tree = 2*parent+1

index for left tree = 2*parent+2

index for itself = 2*parent

7. Explain the differences between inorder successor and inorder predecessor!

When you do the inorder traversal of a binary tree, the neighbors of given node are called Predecessor (the node lies behind of given node) and Successor (the node lies ahead of given node).

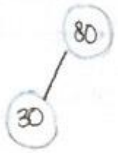
8. Draw the following binary search tree step by step (14 pictures):

- Insert 80, 30, 60, 50, 75
- Delete 60, 30, 75
- Insert 65, 30, 35
- Delete 80, 65, 35

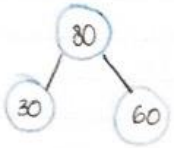
8. - insert : 80, 30, 60, 50, 75
   - delete : 60, 30, 75
   - insert : 65, 30, 35
   - delete : 80, 65, 35

① 

Bf = 0

② 

Bf = 1 - 0 = 1

③ 

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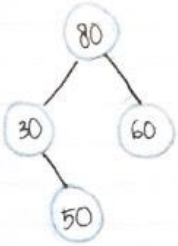
④ 

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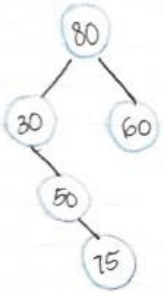
⑤ 

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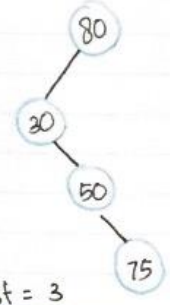
⑦ 

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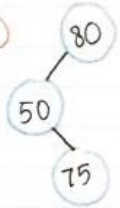
⑧ 

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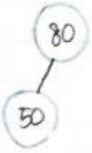
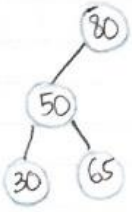
⑥ 

Bf = 1

⑨ 

Bf = 2

⑩ 

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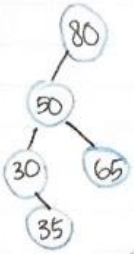
⑪ 

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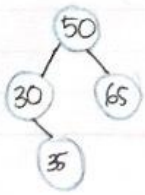
⑫ 

Bf = 2

⑬ 

Bf = 2

⑭ 

Bf = 1