1. Introduction to Non-linear DS and Tree:

Linear DS = Array, Linked List, Stack, Queue, Deque(we can traverse in linear way with the start & end point of these DS)

Non Linear DS = Tree, (no fixed end point, have multiple brunch)

Tree: head/root, 1 node can have upto infinite child, but every child have only one/single parent. head/root has no parent.**Tree shouldn't have any cycle.**

Binary Tree: at most 2 child in a node, Left & Right child.

Uses of Binary Tree Property in DS like:

1. Binary Search Tree (BST)
2. Heap / Priority Queue
3. AVL Tree
4. Red Black Tree
5. Treap
6. Splay Tree
7. Segment Tree

2. Introduction to Graph and Tree:

Graph: node/vertex(points), edge(connection between two node) [Network]

Uses of Graph:

1. Finding Shortest Path

Cyclic Graph: 1->2>4>1 Start and end in same node/vertex.

Tree is also a kind of Graph but Acyclic/Non-Cyclic/ NO Cycle

3. Variations of Binary Tree:

1. Full Binary Tree [every node has 0 or 2 child, **no single child in a node**]
2. Complete Binary Tree [Filled up **without the last** level of the tree]
3. Perfect Binary Tree [**All levels** are FILLED UP]

ALL Perfect Binary Tree are Complete Binary Tree

4. Binary Tree Structure: Theory - node id, node left, node right, node parent.

5. Binary Tree: Implementation **-** build, print