Discrete Mathematics

Dinesh Naik

Manjunath K Vanahalli

Department of Information Technology,
National Institute of Technology Karnataka, India

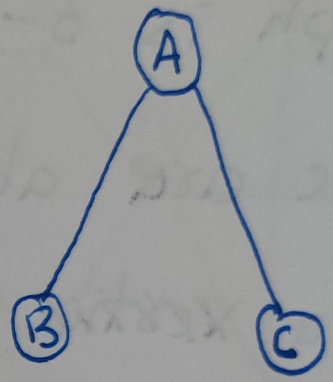
October 1, 2020

Graph Theory

Binary Tree

→A tree which is having utmost children is called binary tree

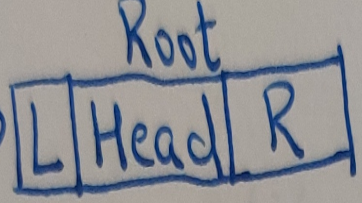
Binary tree is used to store the information in the binary tree

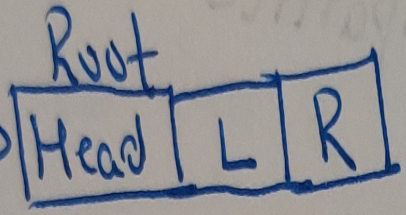


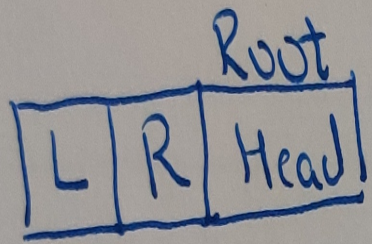
To check the information stored in the binary tree, we need to traverse the binary tree

Graph Theory

Important Methods used for traversing are

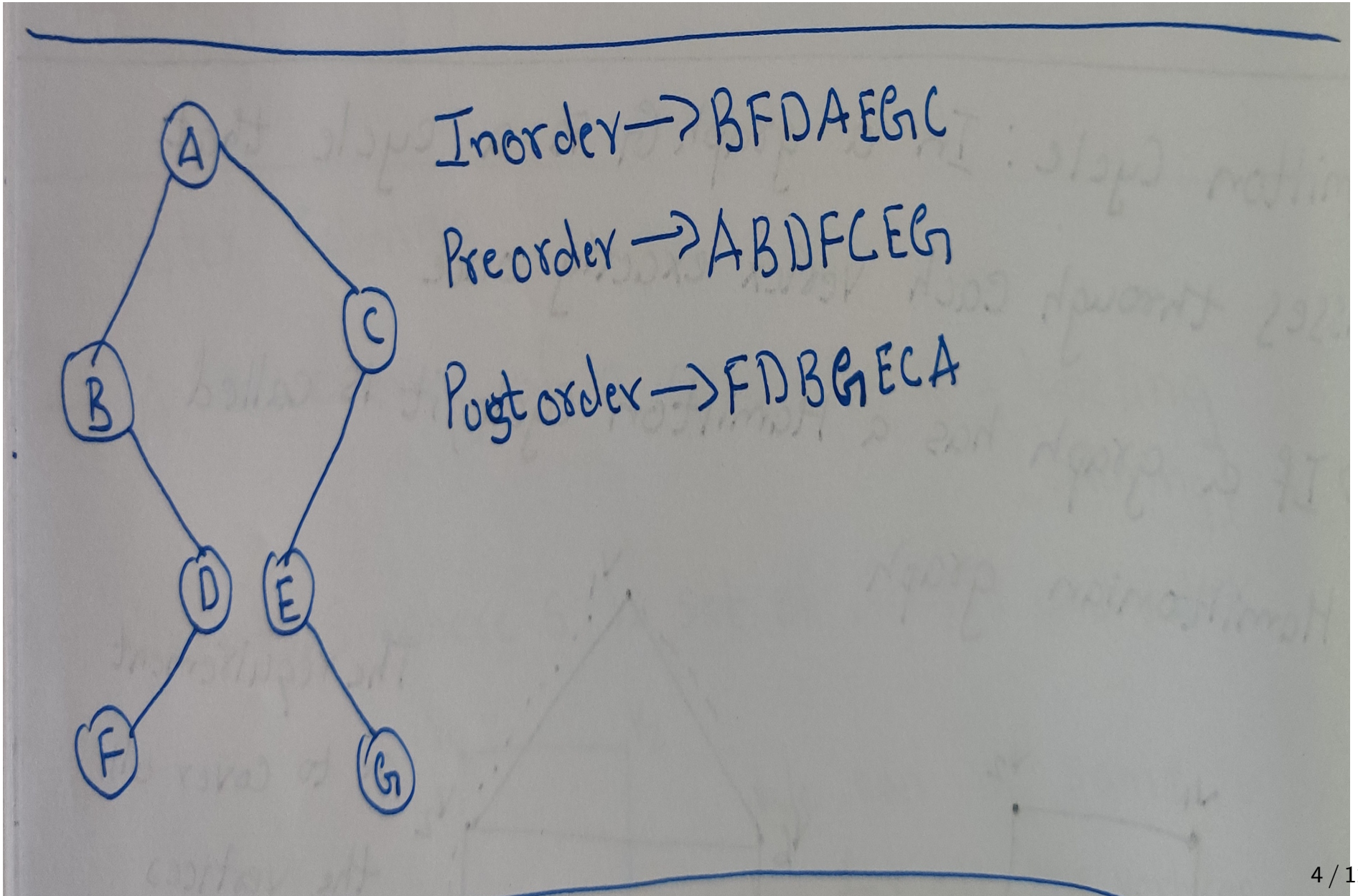
- Inorder → 

→ BAC
- Pre order → 

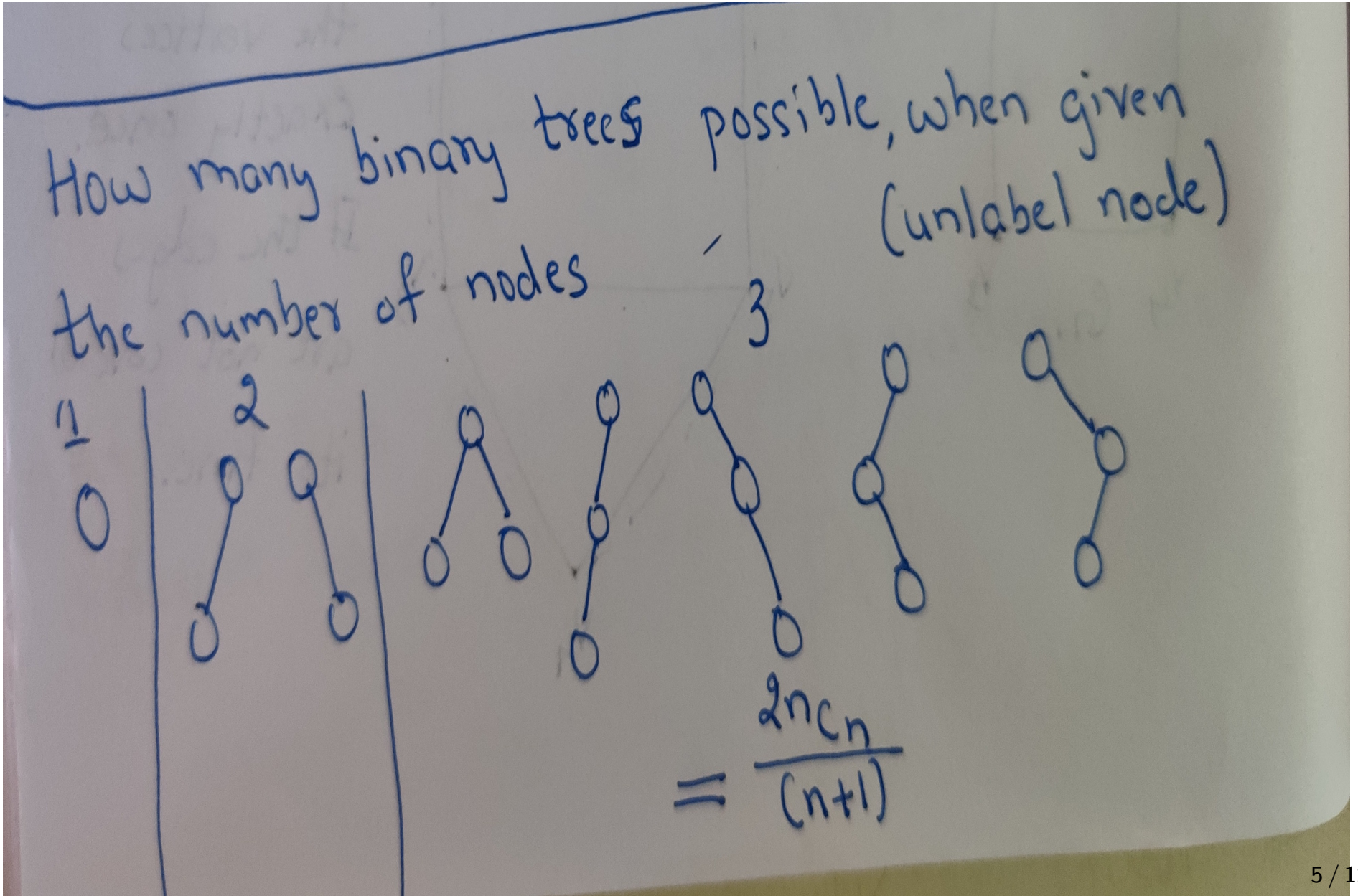
→ ABC
- Post order → 

→ BCA

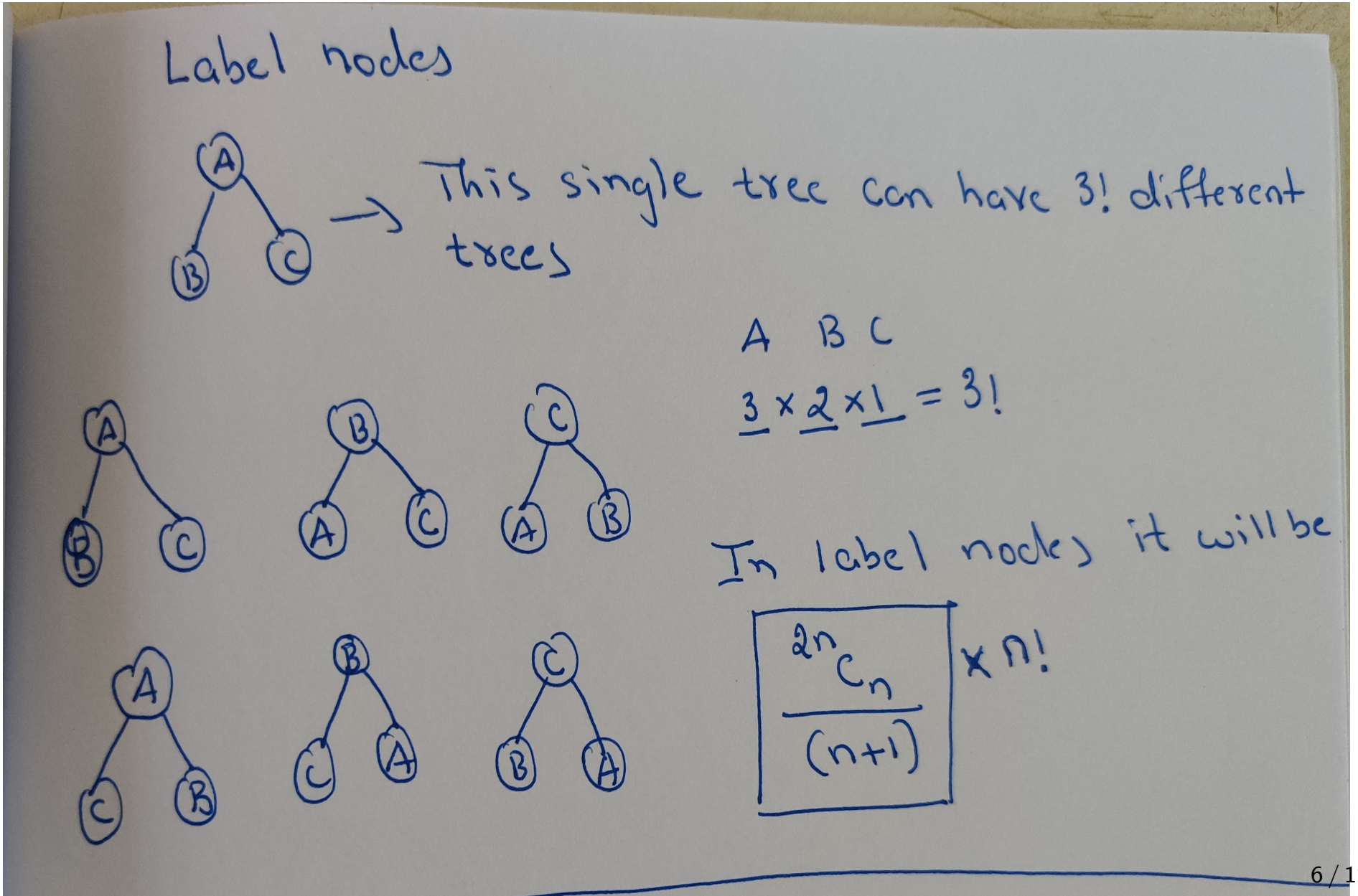
Graph Theory



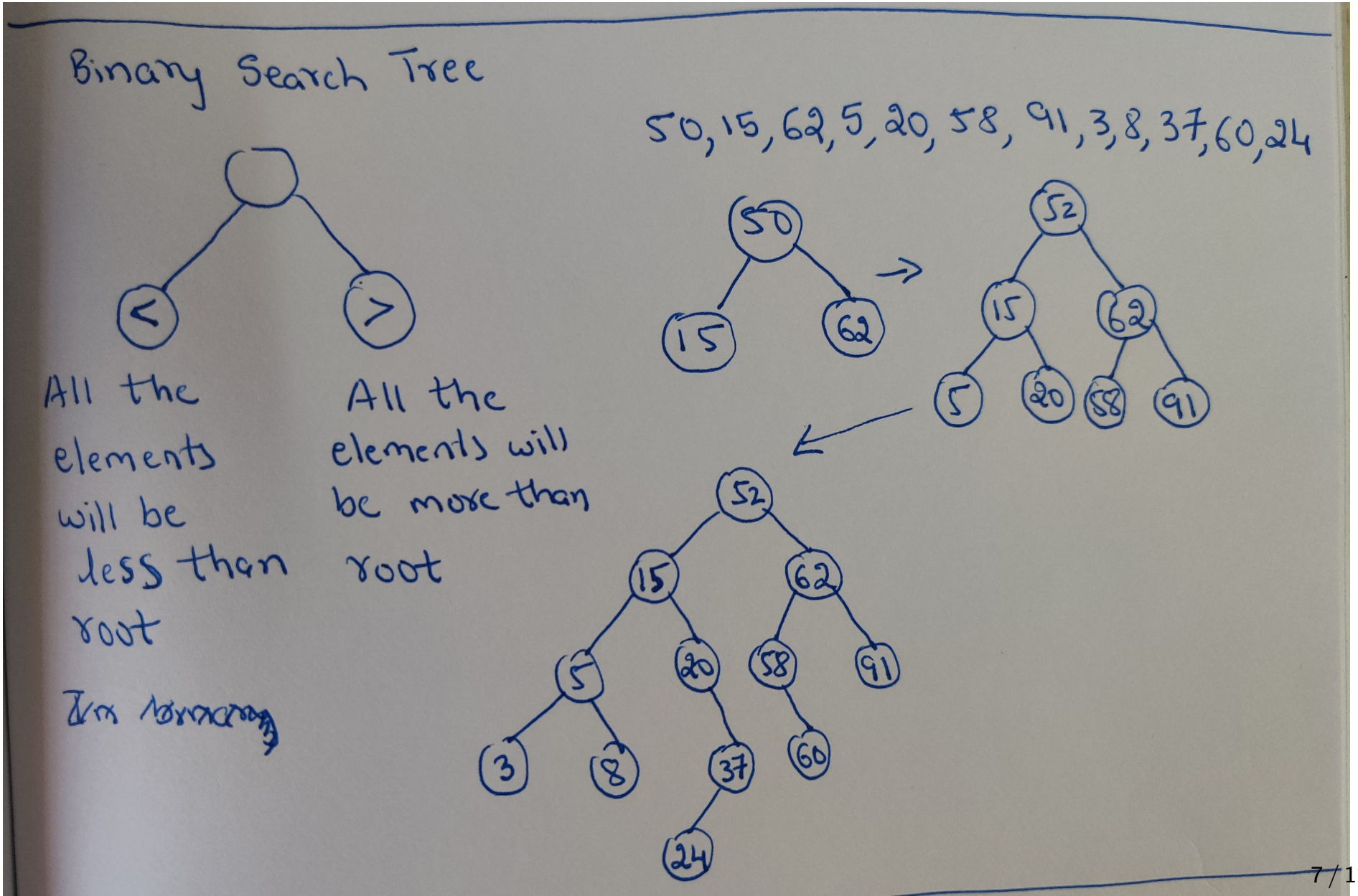
Graph Theory



Graph Theory



Graph Theory



Graph Theory

- Huffman coding is a fundamental algorithm in data compression, the subject devoted to reducing the number of bits required to represent information.
- Huffman coding is extensively used to compress bit strings representing text and it also plays an important role in compressing audio and image files.
- The algorithm begins with a forest of trees each consisting of one vertex, where each vertex has a symbol as its label and where the weight of this vertex equals the frequency of the symbol that is its label.

Graph Theory

- At each step, we combine two trees having the least total weight into a single tree by introducing a new root and placing the tree with larger weight as its left subtree and the tree with smaller weight as its right subtree.

- Furthermore, we assign the sum of the weights of the two subtrees of this tree as the total weight of the tree. (Although procedures for breaking ties by choosing between trees with equal weights can be specified).

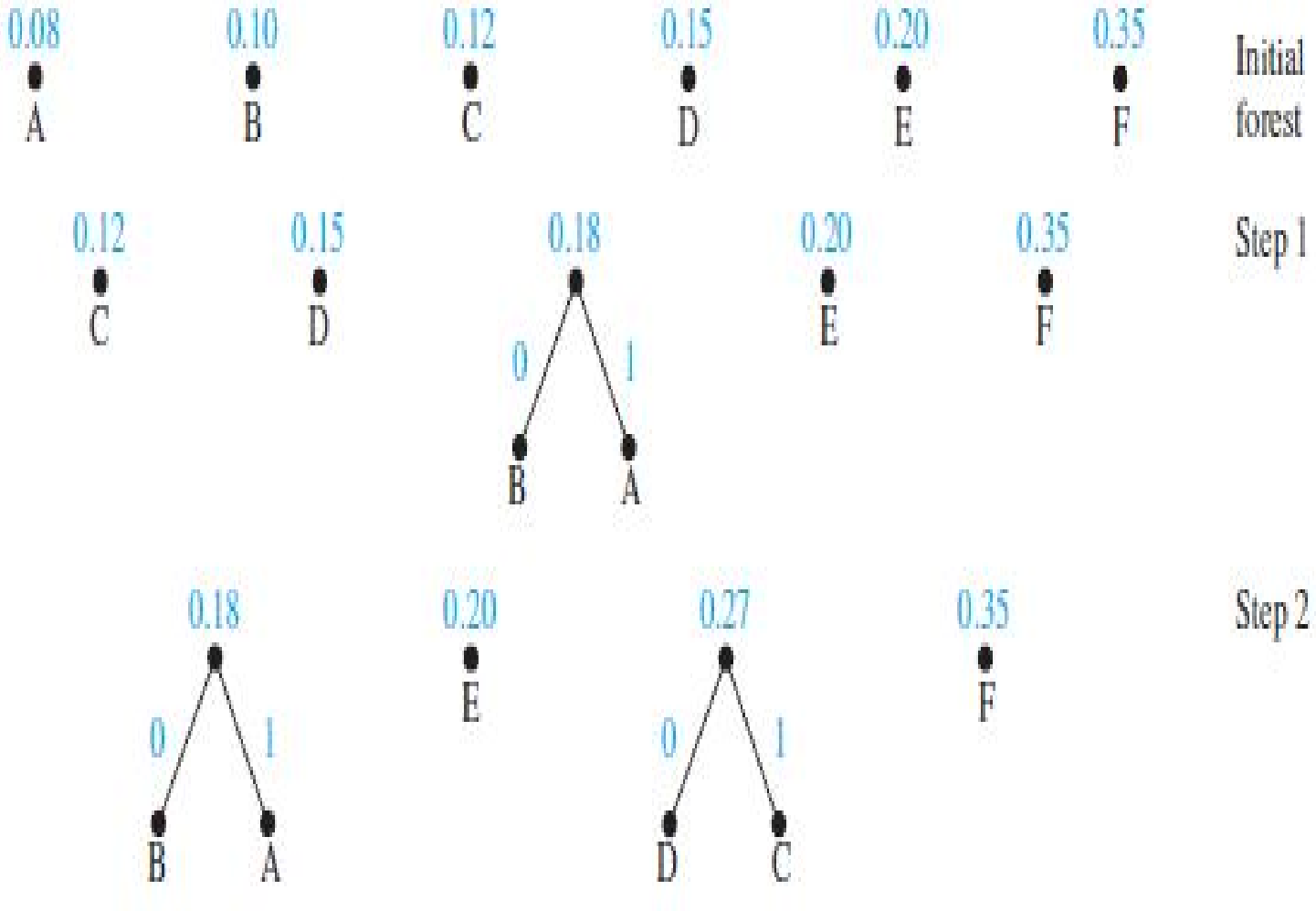
- The algorithm is finished when it has constructed a tree, that is, when the forest is reduced to a single tree.

Graph Theory

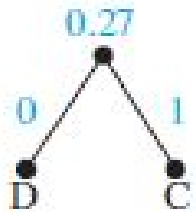
- Use Huffman coding to encode the following symbols with the frequencies listed: A: 0.08, B:0.10, C: 0.12, D: 0.15, E: 0.20, F: 0.35. How many number of bits are required to encode each character?

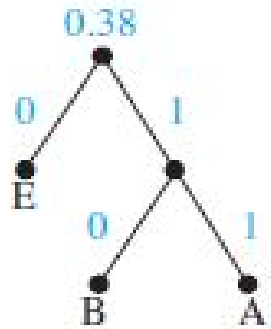
- The encoding produced encodes A by 111, B by 110, C by 011, D by 010, E by 10, and F by 00.

Graph Theory

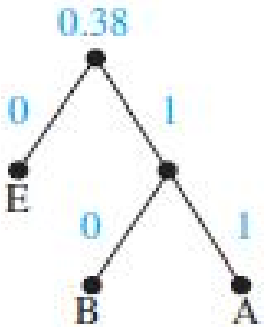


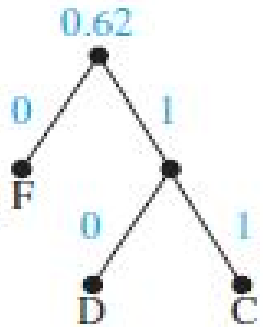
Graph Theory



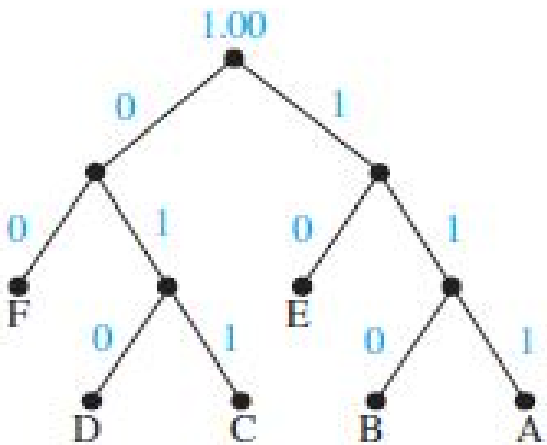


Step 3





Step 4



Step 5