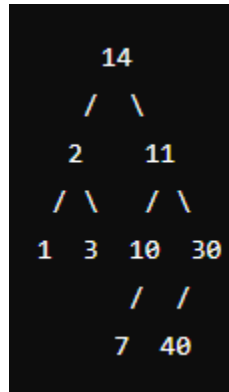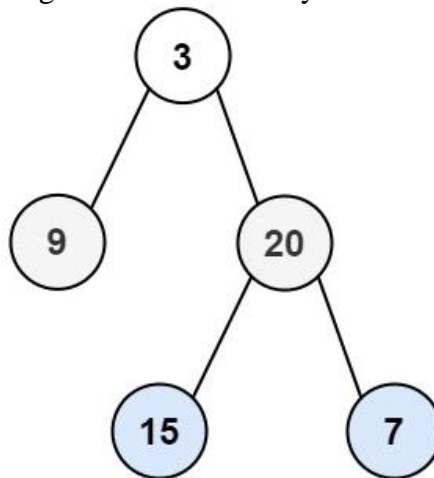Q1. Here is a small binary tree: Write the order of the nodes visited in:

A. An in-order traversal:

B. A pre-order traversal:

C. A post-order traversal:

```
        14
       /  \
      2    11
     / \   / \
    1  3  10  30
          /  /
         7  40
```

Q2. Write a program to return the level order traversal of its nodes' values. (i.e., from left to right, level by level) of the given root of a binary tree.

Q3. Draw an expression tree of the given expression: $(A + (B * C))/(A - C)$

Q4.Draw a Binary Search Tree for the given data. Take 33 as the root node value.

$$80, 70, 66, 56, 33, 23, 14, 10, 7$$

Q5.Construct the tree of the following algebraic expression

$$(z + 3) / (2 + y) * (w - (z + 7))$$

Q6. Using the given expression tree below, answer the following questions
   a. Show the infix expression represented by the tree
   b. Show the prefix expression represented by the tree
   c. Show the postfix expression represented by the tree
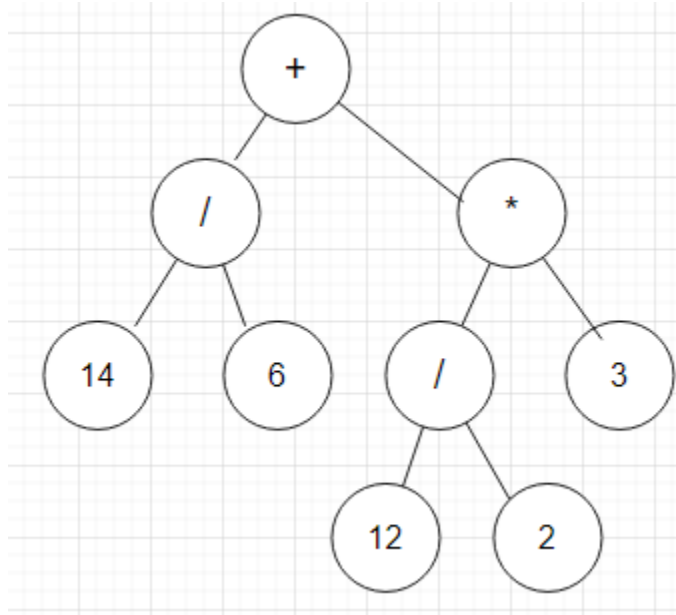
Q7. A file contains the following characters with the frequencies as shown. If Huffman Coding is used for data compression, determine- Huffman Code for each character.

Characters	Frequencies
a	10
e	15
i	12
o	3
u	4
s	13
t	1

Q8. A 10-letter English language word has been encoded using the Huffman Coding values shown below:

Character	Huffman Coding
O	0
D	10
L	110
V	111

The word is written, using Huffman Coding as:

111 0 0 10 0 0 10 0 110 110

Write down the 10-letter word in plain English and calculate the compressed length bits.

Hint: In this question, spaces are used to distinguish the encoding of each letter in the Huffman Coding version of the word.

Q9. Suppose you have a list of integers [2,6,11,4,5,7], write a Merge-Sort code which gives you the output as the sorted list of integers $[2, 4, 5, 6, 7, 11]$. Hint: check Lab-Code MergeSort (uploaded on github)

Q10.   Suppose we have an array of whole numbers as given below:

A= | 4 | 8 | 4 | 2 | 9 | 9 | 6 | 2 | 9 |

Sort the array 'A' using the Counting Sort. Support your answer with the help of a pictorial procedure (Hint: as shown in the lecture slides, each step)

NOTE: in question 10; I am not asking for the definition; you need to do the same steps as we did in the class; e.g. how the array 'C' will be created and then how the frequencies/ranks are incremented in the 'C' and finally how the sorted 'B' array will be produced. Don't expect the marks on the definition, the marks only be given on the given 'A' being sorted and each step pictorially explained.

Q11.   The following graph represents the travel costs between cities.
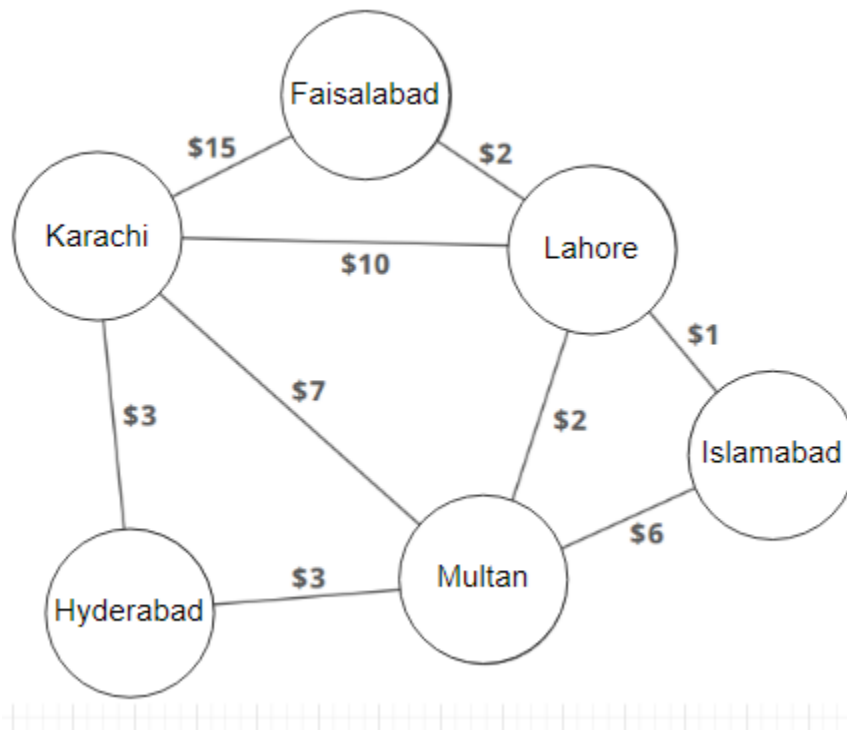
Find the cheapest route from Karachi to Islamabad by using Dijkstra's algorithm. Hint: follow the steps as given the lecture slides

Q12.   We have list of integers [127,324,173,4,38,217,134], write an algorithm of Radix Sort to sorth the given list and the sorted list would look like [4,38,127,134,173,217,324]

Q13.   We had an array

0.78	0.17	0.39	0.26	0.72	0.94	0.21	0.12	0.23	0.68

Write an algorithm to sort the above-given list by using the Bucket Sort algorithm.