

# BRAC University (Department of Computer Science and Engineering)

CSE 220 (Data Structure) for Fall 2024 Semester

## Quiz 3

Student ID:

Section:

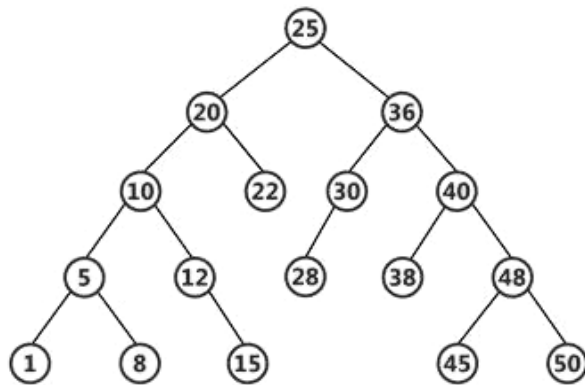
Name: Abdullah Al Mazid Zomader

Full Marks: 20

Duration: 30 minutes

1. Look at the following tree and fill in the table.

[3]



<i>Height of the tree</i>	4		
<i>Height of Node 10</i>	2		
<i>Height of Node 25</i>	4		
<i>Depth of Node 40</i>	2		
<i>Level of Node 12</i>	4		
<b>Max number of nodes possible in this tree</b>	$(2^{(4+1)})-1 = 31$		

2. Write the Pre-order Traversal of the given tree:

[2]

Ans:

Pre-order: root, left, right

Thus ,

Pre-order traversal: 25,20,10,5,1,8,12,15,22,36,30,28,40,38,48,45,50

3. Write the array representation of the given binary tree. Use “N” in case of no valid node in an array position. [3]

Ans:

None, 25, 20, 36, 10, 22, 30, 40, 5, 12, None, None, 28, None, 38, 48, 1, 8, None, 15, None, None, None, None, None, None, None, None, None, None, None, None, 45, 50

4. In a full binary tree, internal nodes (every node except the leaf nodes) have two children. Write pseudo code/ python/ Java program to determine whether a tree is full binary tree or not.[3]

5. You have a hashtable of size  $n$  and a hash function **hashfunc(key)** that takes only a string key as input and outputs an integer value in the range of  $(-10^6, 10^6)$ . You want to insert a key-value pair  $(k, v)$  in the hashtable, where  $k$  is a string and  $v$  is an integer, using the following steps:

1. First, you need to use **hashfunc(key)** to find a suitable index for the pair in the hashtable.
2. You need to first check if the hashtable already contains a pair with the key,  $k$ .
3. If you find such a pair with key,  $k$  in your hashtable, print the message **“Insertion Not Possible”** and terminate the function.
4. If no such pair is already available in the table, you need to insert the pair using the **forward chaining collision resolving method**. The new pair will always sit at the beginning of the chain. Print the message **“Insertion Successful”** in case of successful insertion.

Now write the function **ConditionalInsert(hashtable, (k,v))** that takes the hashtable and the key-value pair as input and attempts to insert the pair in the hashtable following the aforementioned conditions. [8]

Note: The size of the hashtable,  $n$ , can be in the range of  $(1, 100)$