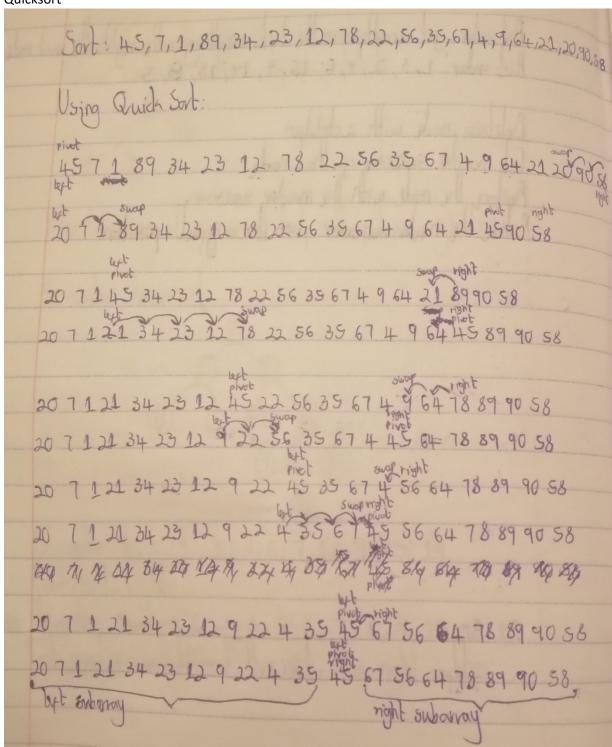
Assignment 2 (20 marks)

- a) Demonstrate how to sort the following data: 45,7,1,89,34,23,12,78,22,56,35,67,4,9,64,21,20,90, 58 using the following sorting techniques
 - (i) Quicksort



lyl subarray
20 7 1 21 34 23 12 9 22 4 35 wit 4 1 31 34 23 12 9 22 20 33 4 7 1 20 34 23 12 9 25 21 35 471 9 34 23 12 20 22 21 35 471 9 20 23 12 34 22 21 35 7 1 9 12 23 20 34 22 21 35 1 1 9 12 20 23 34 22 21 3 4 7 1 9 12 20 23 34 22 21 35

left-left subarray
left-right subarray
left-right subarray
left-right subarray
left-right subarray Lest-right suborray

best swap swap right

23 34 22 2 1 35

entert swap right

21 34 22 23 35

21 34 35

rivot swap right

21 23 24 34 35

rivot right

21 23 24 34 35 swap pivot
7 4 9 12

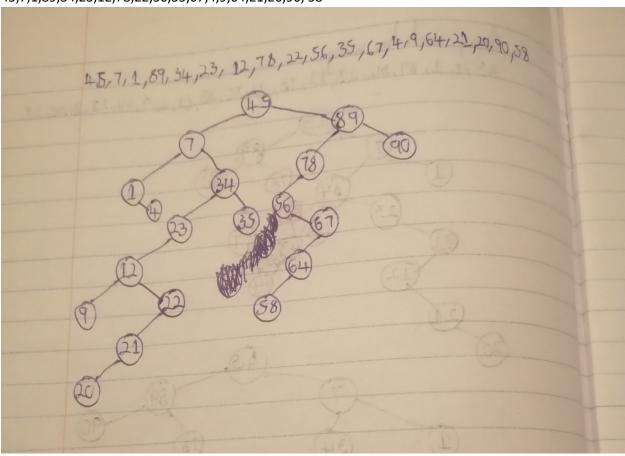
Privot right
Privot
Pri 2 23 34 35

64 18 89 90 58 Supp suap right 56 64

(ii) Mergesort

Maye set 45,7,1,89,34,23,12,78,22,36,35,67,4,9,64,21,20,90,58 45,7,2,89,34,23,12,78,22,56 [39,67,49,64,22,20,90,58] A5,7,1,89,34) [23,12,78,22,56] [35,67,4,9,64] [21,20,90,58] 15,7,1 89,34 [3,12,78 [2,56] [35,67,4] [9,64] [21,20] [90,58] 45,71 59 34 23,12 75 22 56 35,67 4 9 64 21 20 90 58 FITOS 34 BURIS BIS BIS H DEPUDED 58 1,45 1,89 23,34 12,78 22,56 35,67 4,9 22,64 50,90 58 1,7,45,89 12,23,34,78 22,35,567 4,9,21,64 20,58,90 1,7,12,23,34,45,78 200 4,9,21,22,35,56,64,67 (20,58,90) 11.4,7,9,12,21,22,23,34,35,56,64,67,78 20,58,90 1,4,7,9,12,20,21,22,23,34,35,45,56,58,64,67,78,90

b) Construct a Binary Search Tree using the data: 45,7,1,89,34,23,12,78,22,56,35,67,4,9,64,21,20,90, 58



c) Using (b) above show the data output after performing **Preorder**, **Inorder** and **Postorder** traversals

```
Preorder – 45, 7, 1, 4, 34, 23, 12, 9, 22, 21, 20, 35, 89, 78, 56, 67, 64, 58, 90
Inorder – 1, 4, 7, 9, 12, 20, 21, 22, 23, 34, 35, 45, 56, 58, 64, 67, 78, 89, 90
Postorder - 4, 1, 9, 20, 21, 22, 12, 23, 35, 34, 7, 58, 64, 67, 56, 78, 90, 89, 45
```

d) Using (b) above write a BST search program for searching the value 21. The program should automatically compute the number of times moves were made to the left and the number of time moves were made to the right in order to locate the value 21 #include <iostream>

```
using namespace std;
int lcount = 0, rcount = 0;
struct node
{
    int data;
    node *left, *right;
};
```

```
node *insert(node *rootnode, int value)
        if (rootnode==NULL)
        {
                node *newnode = new node;
               newnode->data = value;
               newnode->left = newnode->right = NULL;
               rootnode = newnode;
                return rootnode;
        }
        else if (value<rootnode->data)
                rootnode->left = insert(rootnode->left, value);
        else
        {
                rootnode->right = insert(rootnode->right, value);
        }
}
node *search(node *rootnode, int value)
        if (value==rootnode->data)
               cout<<"The value was found!";
        }
        else if (value<=rootnode->data)
        {
                rootnode->left = search(rootnode->left, value);
                lcount++;
        }
        else
        {
                rootnode->right = search(rootnode->right, value);
               rcount++;
        }
}
int main (){
```

```
node *rootnode = NULL;
        int list[19] ={45,7,1,89,34,23,12,78,22,56,35,67,4,9,64,21,20,90,58};
        cout<<"The values are: ";</pre>
        for(int i=0; i<19; i++)
        {
                cout<<list[i]<<" ";
        }
        for (int i= 0; i<19; i++)
        {
                rootnode = insert(rootnode, list[i]);
        }
        cout << "\nThe value being searched for is 21"<<endl;</pre>
        search(rootnode, 21);
        cout<<endl;
        cout<<"The No of shifts made from the left are: "<<lcount<< endl<< "The No of shifts
made from the right are: "<< rcount;
}
```