EXPERIMENT – 2.2

Name: Rohan Jaiswal
UID: 21BCS2856
Branch: CSE
Section/Group: 608 (B)
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Subject Name: DS
Subject Code: 21CSH-211

Aim of Practical:

Write a program to sort an array of integers in ascending/descending order using
a) Insertion sort.

Program Code:

```
#include<bits/stdc++.h>
using ll = long long;
using namespace std;

void insert(vector<int>& v,int x, int pivot){
    int pos = upper_bound(v.begin(),v.begin()+pivot, x) - v.begin();
    for(int i=pivot-1;i>=pos;--i)
        v[i+1]=v[i];
    v[pos]=x;
}
void insertionSort(vector<int>& v){
    int n= v.size();
    int pivot = 1;
    while(pivot<n){
        cout<<"Step "<<pivot<<": ";
        for(auto i: v) cout<<i<<" ";
        cout<<"\n";
        insert(v,v[pivot], pivot);
        pivot++;
    }
}
```

```
int main(){
    cout<<"Enter size followed by elements of array: ";
    int n;cin>>n;
    vector<int> v(n);
    for(auto &i: v)
        cin>>i;

    insertionSort(v);

    cout<<"\nFinal Step: ";
    for(auto i: v)
        cout<<i<<" ";
}
```

Output:

```
Enter size followed by elements of array: 5
9 8 7 4 2
Step 1: 9 8 7 4 2
Step 2: 8 9 7 4 2
Step 3: 7 8 9 4 2
Step 4: 4 7 8 9 2

Final Step: 2 4 7 8 9
```