Lab No: 19 **Date: 2081/12/05**

Title: Write a program to sort the user input data in ascending or descending order using Insertion sort

Insertion sort is a simple sorting algorithm used to sort a collection of elements in a given order. It is less efficient on large lists than more advanced algorithms such as quicksort, heapsort, or merge sort but it is simple to implement and is suitable to sort small data lists.

Insertion sort is one of the simple and comparison-based sorting algorithms. The basic idea behind the algorithm is to virtually divide the given list into two parts: a sorted part and an unsorted part, then pick an element from the unsorted part and insert it in it's place in the sorted part. It does this till all the elements are placed in the sorted part.

IDE: Visual Studio Code

Language: C

Source code:

```
#include <stdio.h>
#include <conio.h>

void insertionSort(int arr[], int n)
{
    int least, p, i, j, k, temp, pass = 1, key;
    for (i = 0; i < n; i++)
    {
        key = arr[i];
        j = i - 1;
        printf("\nPass %d: \n", pass++);
        while (j >= 0 && arr[j] > key)
        {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
        for (k = 0; k < n; k++)
        {
            printf("%d, ", arr[k]);
        }
        printf("\n");
        printf("inserted value: %d interchange it's position\n", key);
    }
}
int main()
{
    int n, i;
    printf("Enter the size of array: ");
    scanf("%d", &n);
```

```
    int arr[n];
    printf("Enter the array data:\n");//Taking Input
    for (i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }
    insertionSort(arr, n);
    printf("Sorted array: ");
    for (int i = 0; i < n; i++)
        printf("%d ", arr[i]);
    return 0;
}
```

Output:

```
Enter the size of array: 4
Enter the array data:
12
32
33
2

Pass 1:
12, 32, 33, 2,
inserted value: 12 interchange it's position

Pass 2:
12, 32, 33, 2,
inserted value: 32 interchange it's position

Pass 3:
12, 32, 33, 2,
inserted value: 33 interchange it's position

Pass 4:
2, 12, 32, 33,
inserted value: 2 interchange it's position
Sorted array: 2 12 32 33
PS C:\Users\user\OneDrive\Desktop\DSA\ManjilBajgain>
```