# Practical no -3

**Aim:** Write a program to sort the array element using insertion sort.

## Insertion sort:

Insertion sort is one of the internal sorting method. it is implemented by inserting a particular element at the appropriate position . in this method the first iteration starts with a comparison of first element with the $0^{th}$ element , and depending on ascending or descending the numbers will exchange their position. in the second iteration second element will compare with $0^{th}$ element and then second element will compare with the first element. this process is repeated till the last element. after executing the last pass will get the number which in the sorted order.

**Time Complexity:**

| **Insertion sort algorithm** | **Best case** | **Average case** | **Worst case** |
|---|---|---|---|
| | **O(n-1)** | **$O(n^2)$** | **$O(n^2)$** |

## Algorithm:

Algorithm: Insertion sort (int a[],int n)

Here int a[] is the list consisting of N elements

N is the dimension of the array (Size of array)

Steps:-

1) Initialization and declaration of variables int i,j,temp
2) [Establish loop] repeat for i=1 to n-1
    a) Set J=0
    b) Repeat while j < i
        1)[Compare] if(a[i]>a[j]) then Exchange the data of a[i] with a[j]
            Process, temp=a[i];
            a[i]=a[j];
            a[j]=temp;
        2) End IF;

Next J (i.e j++)

c) End while.

3) return;

## Program:

```
#include<stdio.h>
#include<conio.h>
void insertion(int[],int);
void main()
{
        int a[5],i;
        clrscr();
        printf("\n enter the array elements");
        for(i=0;i<5;i++)
        {
                scanf("%d",&a[i]);
        }
        insertion(a,5);
        printf("\n sorted elements are");
        for(i=0;i<5;i++)
        {
                printf("\t%d",a[i]);
        }
        getch();
}
        void insertion(int a[],int n)
  {
        int i,j,temp,target;
        for(i=1;i<n;i++)
```

```
        {
                j=0;
                while(j<i)
                {
                        if(a[j]>a[i])
                        {
                        temp=a[j];
                        a[j]=a[i];
                        a[i]=temp;
                        }
                        j++;
                }
        }
  }
```

**Output:**

Enter the dimension 5

Enter the array element:

8

9

5

4

3

Sorted array is:-

3

4

5

8

9