

G. H. Raison College of Engineering & Management, Wagholi, Pune – 412 207			
Department of Information and Technology Engineering			
SUBJECT :			
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ASSIGNMENT NO: 1

PROBLEM DEFINITION: Implementation of Different Sorting Methods and Techniques.

1. INSERTION SORT

SOURCE CODE:

```

/* c program for insertion sorting */

#include<stdio.h>

#include<conio.h>

void insertion(int [], int );

int main()

{

    int i, size;

    int arr[100];

    printf("\nSITA45_Swayam Terode\n");

    printf("\nInsertion sorting\n\n");

    printf("Enter total no. of elements : ");

```

```

scanf("%d", &size);
for (i = 0; i < size; i++){
    printf("Enter %d element : ", i + 1);
    scanf("%d", &arr[i]);
}

insertion(arr, size);

printf("\nInsertion sorted elements using function \n\n");
for (i = 0; i < size; i++)
    printf(" %d", arr[i]);

getch();

return 0;
}

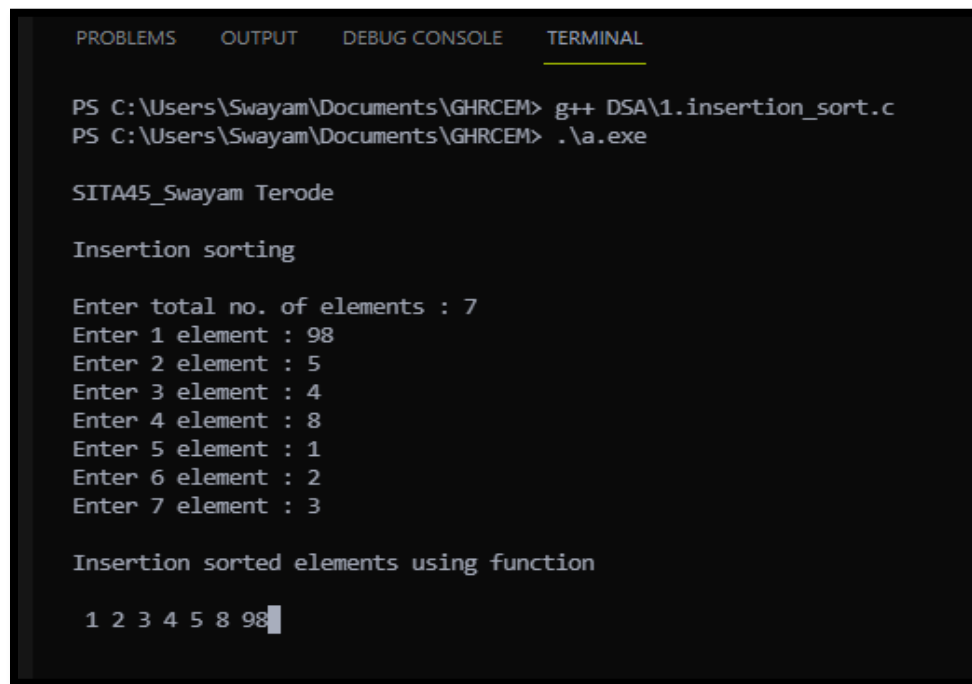
void insertion(int arr[], int size){
    int i, j, tmp;

    for (i = 0; i < size; i++) {
        for (j = i - 1; j >= 0; j--)
        {
            if (arr[j] > arr[j + 1]) {
                tmp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = tmp;
            }
        }
    }
}

```

```
        else
        break;
    }
}
}
```

OUTPUT:

A screenshot of a C++ program's output in a terminal window. The window has tabs for 'PROBLEMS', 'OUTPUT', 'DEBUG CONSOLE', and 'TERMINAL', with 'TERMINAL' selected. The output shows the compilation and execution of a program named '1.insertion_sort.c'. It prompts the user to enter the total number of elements (7) and then seven individual elements (98, 5, 4, 8, 1, 2, 3). After sorting, it displays the sorted elements: 1 2 3 4 5 8 98.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

PS C:\Users\Swayam\Documents\GHRCEM> g++ DSA\1.insertion_sort.c
PS C:\Users\Swayam\Documents\GHRCEM> .\a.exe

SITA45_Swayam Terode

Insertion sorting

Enter total no. of elements : 7
Enter 1 element : 98
Enter 2 element : 5
Enter 3 element : 4
Enter 4 element : 8
Enter 5 element : 1
Enter 6 element : 2
Enter 7 element : 3

Insertion sorted elements using function

1 2 3 4 5 8 98
```

CONCLUSION:

Insertion sort takes maximum time to sort if elements are sorted in reverse order. And it takes minimum time (Order of n) when elements are already sorted.

Time Complexity: $O(n^2)$

● **B: Selection Sort**

SOURCE CODE:

```
/*program to demonstration of selection method*/
#include<stdio.h>
#include<conio.h>
#define SIZE 10
int main()
{
    int i,j,min,temp;
    int arr[SIZE];
    for(i=0; i<SIZE; i++)
    {
        printf("Enter element : ");
        scanf("%d",&arr[i]);
    }
    for(i=0; i<SIZE; i++)
    {
        min=i;
        for(j=i+1; j<SIZE; j++)
            if(arr[j]<arr[min])
                min=j;
        temp=arr[i];
        arr[i]=arr[min];
        arr[min]=temp;
    }
    printf("After selection sort the elements:\n");
    for(i=0; i<SIZE; i++)
        printf("%d\t",arr[i]);
    getch();
    return 0;
}
```

OUTPUT:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL
PS C:\Users\Swayam\Documents\GHRCEM> g++ DSA\slection_sort.c
PS C:\Users\Swayam\Documents\GHRCEM> .\a.exe
Enter element : 78
Enter element : 79
Enter element : 86
Enter element : 5
Enter element : 4
Enter element : 22
Enter element : 55
Enter element : 78
Enter element : 41
Enter element : 2
After selection sort the elements:
2      4      5      22     41     55     78     78     79     86
```

CONCLUSION:

Time Complexity: $O(n^2)$ as there are two nested loops.