Practical 01

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1.1 Bubble_Sort_17.cpp

```
#include<iostream>
using namespace std;

class BubbleSort
{
    private:
    int noe,i,j,temp;
    int arr[100];
    public:
    void GetData()
    {
        cout<<"Enter The Number Of Elements Required To be
Sorted : ";
        cin>>noe;
        for(i=0;i<noe;i++)
        {
            cout<<"Enter Data : ";
            cin>>arr[i];
        }
    }

     void ShowData()
    {
        for(int i=0;i<noe;i++)
        {
            cout<<arr[i]<<" ";
        }
        cout<<"\n\n";
    }
```

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```
       int Sorted()
    {
    for(int i=0;i<noe-1;i++)
        {
            if(arr[i]>arr[i+1])
                return 0;
        }
        return 1;
    }

    void Sort()
    {
        for(i=0;i<noe;i++)
        {

          if(Sorted())
            break;

            for(j=0;j<noe-1;j++)
            {
                if(arr[j]>arr[j+1])
                {
                    temp=arr[j];
                    arr[j]=arr[j+1];
                    arr[j+1]=temp;
                }
            }
             cout<<"Pass "<<i<<":   ";
            ShowData();
        }
    }
};
```

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```cpp
int main()
{
    BubbleSort b=BubbleSort();
    b.GetData();
    cout<<endl<<"Before Sorting :"<<endl;
    b.ShowData();
    cout<<endl<<"After Sorting :"<<endl;
    b.ShowData();
    b.Sort();
    return 0;
}
```

Output

```
C:\Users\gupta\Desktop\SORTING>g++ BubbleSort.cpp -o c.exe

C:\Users\gupta\Desktop\SORTING>c.exe
Enter The Number Of Elements Required To be Sorted : 5
Enter Data : 10
Enter Data : 11
Enter Data : 123
Enter Data : 25
Enter Data : 32

Before Sorting :
10      11      123     25      32


After Sorting :
10      11      123     25      32

Pass 0:  10     11      25      32      123


C:\Users\gupta\Desktop\SORTING>
```

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1.2 Quick_Sort_17.cpp

```
# include<iostream>
using namespace std;

class QuickSort
{
    private:
    int arr[100];
    int noe,pivot,temp,s,e,i,j;

    public:
    void GetData()
    {
        cout<<"Enter size of array : "<<endl;
        cin>>noe;

        for(int i=0;i<noe;i++)
        {
            cout<<"Enter element : ";
            cin>>arr[i];
        }
    }

    void ShowData()
    {
        for(int i=0;i<noe;i++)
        {
            cout<<arr[i]<<"\t";
        }
        cout<<endl;
    }
```

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```
void Sorted()
{
    Quick(0,noe-1);
}

void Quick(int s,int e)
{

    pivot=s;
    i=pivot+1;
    j=e;
    if(j<i)
    {
        return;
    }

    while(arr[pivot]>arr[i])
    {
        i++;
        if(j<i)
        {
            swap(arr[pivot],arr[j]);
            pivot=j;
            Quick(s,pivot-1);
            Quick(pivot+1,e);
            return;
        }
    }
    while(arr[pivot]<arr[j])
    {
        j--;
        if(j<i)
```

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```
            {
                swap(arr[pivot],arr[j]);
                pivot=j;
                Quick(s,pivot-1);
                Quick(pivot+1,e);
                return;
            }
        }
        swap(arr[i],arr[j]);
        ShowData();
        Quick(s,e);
        return;
    }

    void swap(int &a,int &b)
    {
        temp=a;
        a=b;
        b=temp;
    }
};

int main()
{
    QuickSort d;
    d.GetData();
    d.ShowData();
    d.Sorted();
    d.ShowData();
}
```

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Output

```
C:\Users\gupta\Desktop\SORTING>q.exe
Enter size of array :
5
Enter element : 10
Enter element : 21
Enter element : 32
Enter element : 54
Enter element : 211
10      21      32      54      211
10      21      32      54      211

C:\Users\gupta\Desktop\SORTING>
```

1.3 Selection_Sort_17.cpp

```cpp
#include<iostream>
using namespace std;

class SelectionSort
{
    private:
    int noe,i,j,temp,index,count;
    int arr[100];
    public:
    void GetData()
    {
        cout<<"Enter The Number Of Elements Required To be
Sorted : ";
        cin>>noe;
        for(i=0;i<noe;i++)
        {
            cout<<"Enter Data : ";
            cin>>arr[i];
```

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```
        }
    }

     void ShowData()
    {
        for(int i=0;i<noe;i++)
        {

            cout<<arr[i]<<" ";
        }
        cout<<"\n\n";
    }


    int Sorted()
    {
    for(int i=0;i<noe-1;i++)
        {
            if(arr[i]>arr[i+1])
                return 0;
        }
        return 1;
    }

    void Sort()
    {
        for(i=0; i<(noe-1); i++)
        {
        if(Sorted())
            break;
        int min = arr[i];
        for(j=(i+1); j<noe; j++)
```

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```
        {
            if(min>arr[j])
            {
                min = arr[j];
                count++;
                index = j;
            }
        }
        if(count!=0)
        {
            temp = arr[i];
            arr[i] = min;
            arr[index] = temp;
        }
        count=0;
         cout<<"Pass "<<i<<" :  ";
        ShowData();
    }
    }
};

int main()
{
    SelectionSort b=SelectionSort();
    b.GetData();
    cout<<endl<<"Before Sorting :"<<endl;
    b.ShowData();
    cout<<endl<<"After Sorting :"<<endl;
    b.ShowData();
    b.Sort();
       return 0;
}
```

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Output

```
C:\Users\gupta\Desktop\SORTING>s.exe
Enter The Number Of Elements Required To be Sorted : 5
Enter Data : 10
Enter Data : 32
Enter Data : 01
Enter Data : 65
Enter Data : 21

Before Sorting :
10      32      1       65      21


After Sorting :
10      32      1       65      21

Pass 0 :  1     32      10      65      21

Pass 1 :  1     10      32      65      21

Pass 2 :  1     10      21      65      32

Pass 3 :  1     10      21      32      65
```

1.4 Radix_Sort_17.cpp

//Harshil's Code :

```cpp
#include<iostream>
using namespace std;

class Sort{
    int arr[10];
    int noe,size;
    int bucket[10][20], buck_count[10];
```

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```
    int i,j,k,r,no_of_passes,divisor,largest,pass_no;
    public:
    Sort(int n,int s)
    {
        noe=n;
        size=s;
        no_of_passes=0;
        divisor=1;
    }

    void getdata()
    {
        for(int i=0;i<noe;i++)
        {
            cout<<"Enter element : ";
            cin>>arr[i];
            if(arr[i]<0 )
        {
        cout<<"negative number not allowed"<<endl;
        cout<<"Re-Enter The Value :";
        cin>>arr[i];
        }
        }
    }

    void sort()
    {
        cout<<"In sort\n";
        largest=arr[0];
        for(i=1;i<noe;i++)
        {
        if(Sorted())
```

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```
        {
            cout<<"SORTED";
            break;
        }
        if(arr[i] > largest)
        largest=arr[i];
        }
        while(largest > 0)
        {
        no_of_passes++;
        largest /= 10;
        }
        for(pass_no=0; pass_no < no_of_passes; pass_no++)
        {
        for(k=0; k<10; k++)
        buck_count[k]=0;
        for(i=0;i<noe;i++)
        {
        r=(arr[i]/divisor) % 10;
        bucket[r][buck_count[r]++]=arr[i];
        }
        i=0;
        for(k=0; k<10; k++)
        {
        for(j=0; j<buck_count[k]; j++)
        arr[i++] = bucket[k][j];
        }
        divisor =divisor * 10;
        showdata();
        }

    }
```

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```
 int Sorted()
    {
    for(int i=0;i<noe-1;i++)
        {
            if(arr[i]>arr[i+1])
                return 0;
        }
        return 1;
    }

    void showdata()
    {
        for(int i=0;i<noe;i++)
            cout<<" "<<arr[i];
        cout<<endl;
    }
};

int main(){
    int noe, size;
    cout<<"Enter size of array : ";
        cin>>size;
    cout<<"Enter no of elements in array : ";
    cin>>noe;
    if(noe>size)
        cout<<"No of elements exceeds array size";
    else
    {
    Sort s(noe,size);
    s.getdata();
    s.sort();
```

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```
    }
    finish:
    return 0;
}
```

Output

```
C:\Users\gupta\Desktop\SORTING>r.exe
Enter size of array : 10
Enter no of elements in array : 5
Enter element : 102
Enter element : 2547
Enter element : 324
Enter element : 2214
Enter element : 3256
In sort
 102 324 2214 3256 2547
 102 2214 324 2547 3256
 102 2214 3256 324 2547
 102 324 2214 2547 3256
```

1.5 Insertion_Sort_17.cpp

```
#include<iostream>
using namespace std;

class InsertionSort
{
    private:
    int noe,i,j,temp,index,count;
    int arr[100];
    public:
    void GetData()
    {
```

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```
        cout<<"Enter The Number Of Elements Required To be
Sorted : ";
        cin>>noe;
        for(i=0;i<noe;i++)
        {
            cout<<"Enter Data : ";
            cin>>arr[i];
        }
    }

     void ShowData(int num)
    {
        for(int i=0;i<num;i++)
        {
            cout<<arr[i]<<" ";
        }
        cout<<"\n\n";
    }

    int Sorted()
    {
    for(int i=0;i<noe-1;i++)
        {
            if(arr[i]>arr[i+1])
                return 0;
        }
        return 1;
    }

    void Sort()
    {
```

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```
     for(i=0;i<noe;i++)
     {
        if(Sorted())
            break;
         temp=arr[i];
         j=i;

         while(j>0 && temp<arr[j-1])
          {
             arr[j]=arr[j-1];
             j=j-1;
          }
         arr[j]=temp;
          cout<<"Pass "<<i<<" :  ";
         ShowData(i+1);
     }

    }
};


int main()
{
    InsertionSort b=InsertionSort();
    b.GetData();
    cout<<endl<<"After Sorting :"<<endl;
    b.Sort();
    return 0;
}
```

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Output

```
C:\Users\gupta\Desktop\SORTING>i.exe
Enter The Number Of Elements Required To be Sorted : 5
Enter Data : 10
Enter Data : 2
Enter Data : 04
Enter Data : 6
Enter Data : 55

After Sorting :
Pass 0 :  10

Pass 1 :  2     10

Pass 2 :  2     4       10

Pass 3 :  2     4       6       10
```

1.6 Shell_Sort_17.cpp

```
# include<iostream>
using namespace std;

class ShellSort
{
    private:
    int arr[100];
    int noe,temp,i,j,increment,p;

    public:
    void GetData()
    {
        cout<<"Enter size of array : "<<endl;
        cin>>noe;
        for(int i=0;i<noe;i++)
```

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```
        {
            cout<<"Enter Data : ";
            cin>>arr[i];
        }
    }

    void ShowData()
    {
        for(int i=0;i<noe;i++)
        {
            cout<<arr[i]<<"\t";
        }
        cout<<endl;
    }

     int Sorted()
    {
    for(int i=0;i<noe-1;i++)
        {
            if(arr[i]>arr[i+1])
                return 0;
        }
        return 1;
    }



    void Sort()
    {

        for(increment = noe/2 ; increment > 0 ;
increment=increment/2)
```

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```
        {
            if(Sorted())
            {
                break;
            }

            for(j = increment ; j < noe ; j++)
            {
                for(i = j - increment ; i >= 0 ; i=i-increment)
                {
                    if(arr[i+increment] > arr[i])
                    {
                        break;
                    }
                    else
                    {
                        swap(arr[i+increment],arr[i]);
                    }
                }
            }
            ShowData();

        }
    }

    void swap(int &a,int &b)
    {
        temp=a;
        a=b;
        b=temp;
    }
};
```

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```
int main()
{
    ShellSort d;
    d.GetData();
    d.ShowData();
    d.Sort();
    return 0;
}
```

Output

```
C:\Users\gupta\Desktop\SORTING>s.exe
Enter size of array :
5
Enter Data : 20
Enter Data : 14
Enter Data : 32
Enter Data : 144
Enter Data : 21
20      14      32      144     21
20      14      21      144     32
14      20      21      32      144
```