Aim:

Write a program to sort (Ascending order) the given elements using merge sort technique.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (\n).

Source Code:

MergeSortMain.c

```c
#include<stdio.h>
void display(int[],int);
void main()
{
    int arr[15],i,n;
    printf("Enter array size : ");
    scanf("%d",&n);
    printf("Enter %d elements : ",n);
    for(i=0;i<n;i++)
    {
        scanf("%d",&arr[i]);
    }
    printf("Before sorting the elements are : ");
    display(arr,n);
    splitAndMerge(arr,0,n-1);
    printf("After sorting the elements are : ");
    display(arr,n);
}
void display(int arr[15],int n)
{
    int i;
    for(i=0;i<n;i++)
        printf("%d ",arr[i]);
    printf("\n");
}
```

```c
void merge(int arr[15],int low,int mid,int high)
{
    int i=low,h=low,j=mid+1,k,temp[15];
    while(h<=mid&&j<=high)
    {
        if(arr[h]<=arr[j])
        {
            temp[i]=arr[h];
            h++;
        }
        else
        {
            temp[i]=arr[j];
            j++;
        }
        i++;
    }
    if(h>mid)
    {
        for(k=j;k<=high;k++)
        {
            temp[i]=arr[k];
            i++;
        }
    }
    else
    {
        for(k=h;k<=mid;k++)
        {
            temp[i]=arr[k];
            i++;
        }
    }
    for(k=low;k<=high;k++)
    {
        arr[k]=temp[k];
    }
}
void splitAndMerge(int arr[15],int low,int high)
{
    if(low<high)
    {
        int mid=(low+high)/2;
        splitAndMerge(arr,low,mid);
        splitAndMerge(arr,mid+1,high);
        merge(arr,low,mid,high);
    }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter array size : 5

Enter 5 elements : 34 67 12 45 22
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67

Test Case - 2
User Output
Enter array size : 8
Enter 8 elements : 77 55 22 44 99 33 11 66
Before sorting the elements are : 77 55 22 44 99 33 11 66
After sorting the elements are : 11 22 33 44 55 66 77 99

Test Case - 3
User Output
Enter array size : 5
Enter 5 elements : -32 -45 -67 -46 -14
Before sorting the elements are : -32 -45 -67 -46 -14
After sorting the elements are : -67 -46 -45 -32 -14