Lab Manual Program 7:

==Prog 7: Sort the given set of N numbers using Bubble sort.==

AIM: Sort the given set of N numbers using Bubble sort.

PROBLEM STATEMENT

Develop an algorithm, implement and execute a C program that reads N integer numbers and arrange them in ascending order using BUBBLE SORT
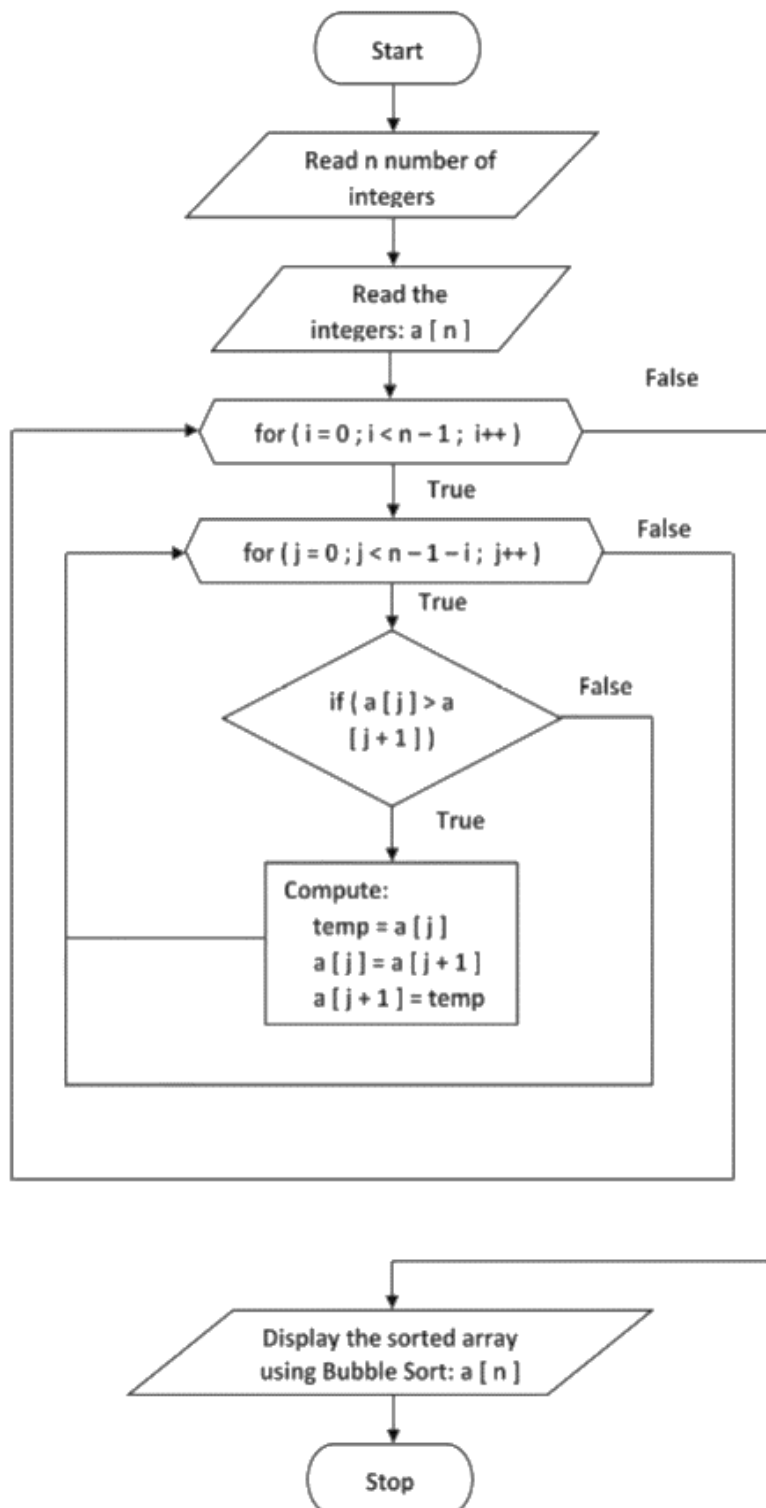
ALGORITHM

Input: Size of the array and elements to be sorted

Output: List of elements in sorted order

1. Start
2. Read the size of array: a[n]
3. Read the elements of array: n

4. Check if i<n-1 where i is the position of elements in the array and n is the total count of elements in the array. If the condition is true go to step 5 and increment i value. Repeat this step until the condition is false. If the condition is false go to step 8.

5. Check if j<n-1-i, if true go to step 6 and increment j value. Repeat this step until the condition is false. If the condition is false go to step 4.

6. check if (a[j] > a[j+1]), if true go to step 7 else go to step 5
7. Compute:

$$temp=a[j]$$
$$a[j]=a[j+1]$$
$$a[j+1]=temp$$

8. Display the elements of array in sorted order: a[n]

FLOWCHART

```
                          ┌──────────┐
                          │  Start   │
                          └────┬─────┘
                               │
                 ┌─────────────▼─────────────┐
                 │     Read n number of      /
                /        integers            │
                 └─────────────┬─────────────┘
                               │
                 ┌─────────────▼─────────────┐
                 │       Read the            /
                /    integers: a [ n ]       │
                 └─────────────┬─────────────┘
                               │                          False
              ┌────────────────▼────────────────┐
         ┌───►│  for ( i = 0 ; i < n – 1 ; i++ ) ├──────────────┐
         │    └────────────────┬────────────────┘              │
         │                     │ True                          │
         │                     │                          False │
         │   ┌─────────────────▼─────────────────┐             │
      ┌──┼──►│  for ( j = 0 ; j < n – 1 – i ; j++) ├────────┐   │
      │  │   └─────────────────┬─────────────────┘         │   │
      │  │                     │ True                      │   │
      │  │              ╱─────────────╲           False    │   │
      │  │             ╱  if ( a [ j ] > a ╲────────────┐  │   │
      │  │             ╲     [ j + 1 ] )   ╱            │  │   │
      │  │              ╲─────────────╱                 │  │   │
      │  │                     │ True                   │  │   │
      │  │          ┌──────────▼──────────┐             │  │   │
      │  │          │ Compute:            │             │  │   │
      │  └──────────┤   temp = a [ j ]    │             │  │   │
      │             │   a [ j ] = a [ j + 1 ]           │  │   │
      │             │   a [ j + 1 ] = temp │             │  │   │
      │             └─────────────────────┘             │  │   │
      │                                                 │  │   │
      └─────────────────────────────────────────────────┘  │   │
                                                            │   │
                                                            │   │
                            ┌───────────────────────────────┘   │
                            │                                   │
                 ┌──────────▼───────────┐◄──────────────────────┘
                 │  Display the sorted array   /
                /   using Bubble Sort: a [ n ] │
                 └──────────┬───────────┘
                            │
                       ┌────▼─────┐
                       │  Stop    │
                       └──────────┘
```

PROGRAM CODE:

```c
#include<stdio.h>

int main()
{
        int a[20],n,i,j,temp;

        // Accept array size
        printf("Enter the number of elements :");
        scanf("%d",&n);

        // Accept n elements into the array
        printf("Enter %d integers :",n);
        for(i=0;i<n;i++)
        {
                scanf("%d",&a[i]);
        }

        // Sort the array elements

        for(i=0;i<n-1;i++)
        {
                for(j=0;j<n-1-i;j++)
                {
                        if(a[j] > a[j+1])
                        {
                                temp=a[j];
                                a[j]=a[j+1];
                                a[j+1]=temp;
                        }
                }
        }

        // print the sorted array
        printf("The sorted array is ....\n");
        for(i=0;i<n;i++)
        {
                printf("%d\t",a[i]);
        }

        printf("\n");
        return 0;
}
```

SAMPLE OUTPUT

1.
$ cc prog7.c
$ ./a.out
Enter the number of elements :5
Enter 5 integers :1
3
4
2
5
The sorted array is ....
1   2   3   4   5

2.
$ ./a.out
Enter the number of elements :6
Enter 6 integers :23
55
10
-10
0
-400
The sorted array is ....
-400   -10   0   10   23   55

QUESTIONS FOR VIVA

1. What is bubble sorting?
2. How does nested for loop works?
3. What are the passes in a bubble sorting method?