Sorting :- In simple word sorting is the ordering a ~~list~~ list of objects.

Sorting is of two type. If the number of object is small enough to fits into the main memory, this is called "internal sorting".

If the number of object is so large that some of them reside on external storage during the sort, is called external sorting.

→ Three type of sorting is as :

1. bubble sorting
2. insertion sorting
3. selection sorting

Bubble sorting :- Bubble sort is a sorting algorithm where repeatedly iterate through the array and swap adjacent elements that are unordered. Repeat this until array is sorted.

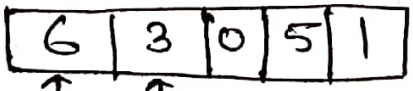
example of bubble sort :

Unsorted Array = 6 3 0 5 1

→ In case of bubble sort various "pass" used to sort the unsorted array.

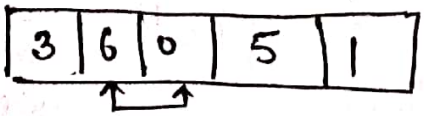
Pass 1 :-

(i)



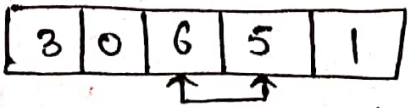
Compare and swap if not in order

(ii)



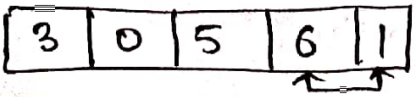
compare and swap if not in order

(iii)



Compare and swap

(iv)



Compare and swap

(v.)

3	0	5	1	6

→ After first pass the highest/biggest element of Array is reached at correct position (extreme right in array).

Second pass 2: for second pass input array is the Output of Pass 1.

(i)

3	0	5	1	6

Compare & swap

(ii)

0	3	5	1	6

Compare and find at ordered place.

(iii)

0	3	5	1	6

Compare and swap

(iv)

0	3	1	5	6

Compare and find at ordered place

→ After second pass the second biggest element is reached at the correct position in array.

Pass 3:

(i)

0	3	1	5	6

Compare and find at correct ordered

(ii)

0	3	1	5	6

Compare & swap

(iii)

0	1	3	5	6

→ rest element are already sorted in array after third place.

Pass 4:

0	1	3	5	6

already sorted

* Complexity of bubble sort in average case $O(n^2)$ and worst case $O(n^2)$. so it is not so much efficient algorithm.

Program for bubble sort:-

```
#include <stdio.h>
# include <conio.h>
 void main()
  {
    int a[100], n, c, d, swap;
  Printf("Enter the no. of element");
   Scanf("%d",&n);
  Printf("Enter the Array element");
    for(c=0; c<n; c++)
      Scanf("%d",&a[c]);

   for(c=0; c<n-1; c++)
     {
       for(d=0; d<n-c-1; d++)
       {
          if(a[d] > a[d+1])
            {
              swap = a[d];
              a[d] = a[d+1];
              a[d+1] = swap;
            }
       }
     }
Printf("sorted list in ascending order");
    for(c=0; c<n; c++)
       Printf("%d", a[c]);

 }
```

I/P section

Processing section

O/P section

Bubble sort with function :-

(MA) (7)

```
#include <stdio.h>
#include <conio.h>
void bubble_sort(int [], int);
void main()
{
  int a[100], n, c;
 printf("Enter number of element");
  scanf("%d", &n);
 printf("Enter array element");
 for(c=0; c<n; c++)
  scanf("%d", &a[c]);
 bubble_sort(a, n);
 Printf("Sorted array in ascending order");
    for(c=0; c<n; c++)
       Printf("%d", a[c]);
}
void bubble_sort(int b[], int n)
{
   int c, d, t;
 for(c=0; c<n-1; c++)
  {
   for(d=0; d<n-c-1; d++)
    {
      if(b[d] > b[d+1])
       {
          t = b[d];
         b[d] = b[d+1];
          b[d+1] = t;
       }
    }
  }
}
```