EXP 3

Sort a given set of N integer elements using Merge Sort technique

CODE:

```
#include <stdio.h>
#include <stdlib.h>


void merge(int low,int mid,int high,int array[20],int mer[20])
{ int i = low; int
   j = mid+1;
   int k = 0;

  while(i<=mid && j<=high)
  { if(array[i]<array[j])
      {
         mer[k] = array[i];
         i++; k++;
      }
      else
      {
         mer[k] = array[j];
         j++; k++;
      }
  }

  while (i <= mid)
  {
      mer[k] = array[i];
      i++;
```

```
        k++;
    }

    while (j <= high)
    {
        mer[k] =
        array[j]; j++; k++;
    }

    for(int i=0;i<k;i++)
    {
        array[low+i] = mer[i];
    }
}

void merge_sort(int low,int high,int array[20],int merged[20])
{
    if(low<high)
    {
        int mid = (low+high)/2; merge_sort(low,mid,array,merged);
        merge_sort(mid+1,high,array,merged);
        merge(low,mid,high,array,merged);
    }
}


int main()
{
    int n,array[30]; printf("Enter no.
    of elements:");
    scanf("%d",&n); printf("Enter elements:");
    for(int i=0;i<n;i++)
```

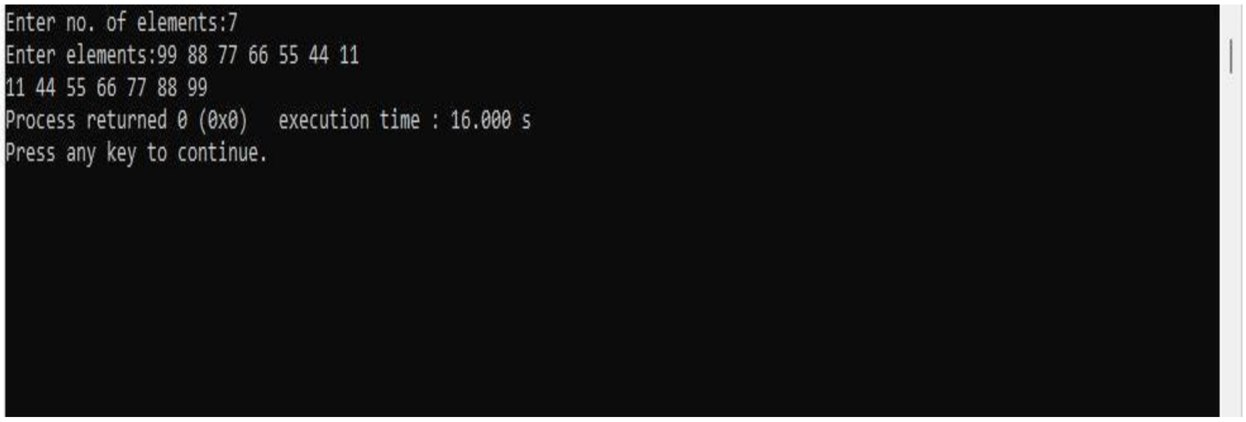
```
  {
     scanf("%d",&array[i]);
  }

  int merged[30]; merge_sort(0,n-

  1,array,merged);

  for(int i=0;i<n;i++)
  { printf("%d ",array[i]);
  }
}
```

OUTPUT:



```
Enter no. of elements:7
Enter elements:99 88 77 66 55 44 11
11 44 55 66 77 88 99
Process returned 0 (0x0)   execution time : 16.000 s
Press any key to continue.
```

EXP 4

Implement Johnson Trotter algorithm to generate permutations.

CODE:

```
#include <stdio.h>
#include <stdlib.h>
int flag = 0;

int swap(int *a,int *b) {
int t = *a; *a
= *b;
*b = t;
}
int search(int arr[],int num,int mobile)
{ int
 g;
for(g=0;g<num;g++) { if(arr[g]
== mobile)
   return g+1;
else
   flag++;
}
return -1;
}

int find_Moblie(int arr[],int d[],int num)
{
int mobile = 0; int
mobile_p = 0;
int i;
for(i=0;i<num;i++)
{
if((d[arr[i]-1] == 0) && i != 0)
{ if(arr[i]>arr[i-1] && arr[i]>mobile_p)
{
```

```
mobile = arr[i]; mobile_p
= mobile;
}
else flag++;
}
else if((d[arr[i]-1] == 1) & i != num-1)
{
if(arr[i]>arr[i+1] && arr[i]>mobile_p)
{
mobile = arr[i]; mobile_p
= mobile;
}
else flag++;
}
else flag++;
}
if((mobile_p == 0) && (mobile == 0)) return
0; else return mobile;
}
void permutations(int arr[],int d[],int num)
{ int
 i;
int mobile = find_Moblie(arr,d,num); int
pos = search(arr,num,mobile);
if(d[arr[pos-1]-1]==0) swap(&arr[pos-
1],&arr[pos-2]); else swap(&arr[pos-
1],&arr[pos]); for(int i=0;i<num;i++)
{ if(arr[i] >
mobile)
{ if(d[arr[i]1]==0)
d[arr[i]1] = 1;
```

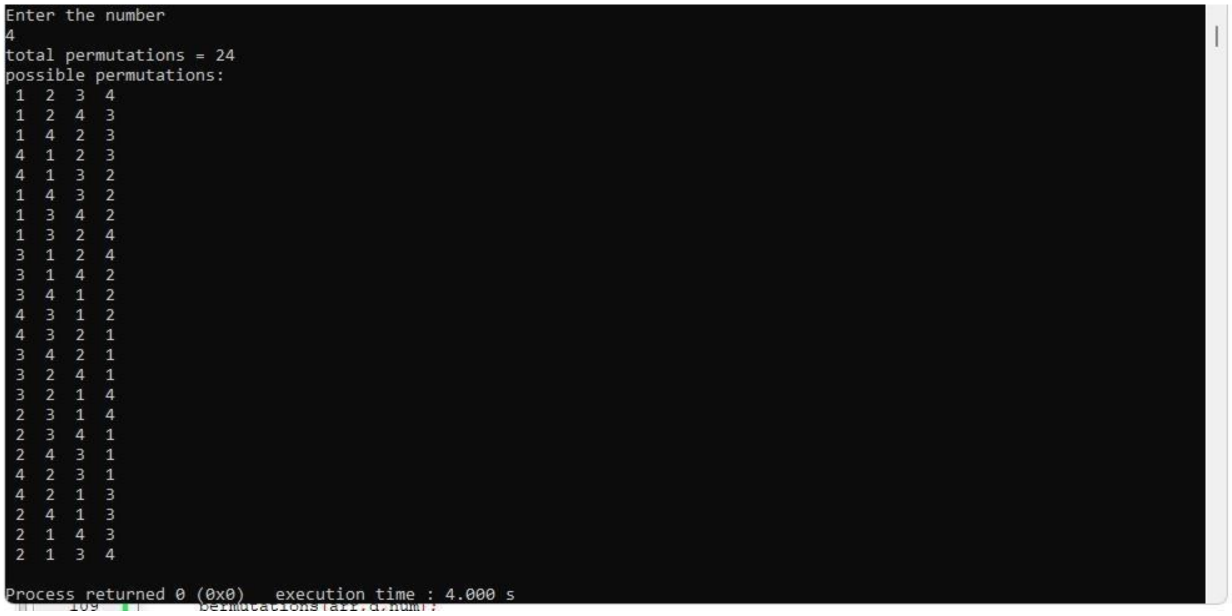
```
else d[arr[i]-1] =
0;
}
}
for(i=0;i<num;i++) {
printf(" %d
",arr[i]); } }

int factorial(int k)
{ int f = 1; int i =
 0;
 for(i=1;i<k+1;i++
 ) f = f*i; return f;
}
int main()
{
int num = 0;
int i; int j;
int z = 0; printf("Enter the
number\n"); scanf("%d",&num); int
arr[num],d[num]; z = factorial(num);
printf("total permutations = %d",z);
printf("\npossible permutations:
\n"); for(i=0;i<num;i++)
{
d[i] = 0; arr[i] =
i+1; printf(" %d
",arr[i]);
} printf("\n"); for(j=1;j<z;j++) {
permutations(arr,d,num);
printf("\n");
   }
```

return 0;

}

OUTPUT:



```
Enter the number
4
total permutations = 24
possible permutations:
 1  2  3  4
 1  2  4  3
 1  4  2  3
 4  1  2  3
 4  1  3  2
 1  4  3  2
 1  3  4  2
 1  3  2  4
 3  1  2  4
 3  1  4  2
 3  4  1  2
 4  3  1  2
 4  3  2  1
 3  4  2  1
 3  2  4  1
 3  2  1  4
 2  3  1  4
 2  3  4  1
 2  4  3  1
 4  2  3  1
 4  2  1  3
 2  4  1  3
 2  1  4  3
 2  1  3  4

Process returned 0 (0x0)   execution time : 4.000 s
```