

WEEK 3

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 n,int mobile)
{
    int g;
    for(g=0;g<n;g++) {
        if(arr[g] == mobile)
            return g+1;
    }
    return -1;
}
```

```

int fm(int arr[],int d[],int n)
{
    int mobile = 0;
    int mp = 0;
    int i;
    for(i=0;i<n;i++)
    {
        if((d[arr[i]-1] == 0) && i != 0)
        {
            if(arr[i]>arr[i-1] && arr[i]>mp)
            {
                mobile = arr[i];
                mp = mobile;
            }
            else
                flag++;
        }
        else if((d[arr[i]-1] == 1) & i != n-1)
        {
            if(arr[i]>arr[i+1] && arr[i]>mp)
            {
                mobile = arr[i];
                mp = mobile;
            }
        }
        else

```

```

        flag++;
    }
    else
        flag++;
    }
    if((mp == 0) && (mobile == 0))
        return 0;
    else
        return mobile;
}

void permut(int arr[],int d[],int n)
{
    int i;
    int mobile = fm(arr,d,n);
    int pos = search(arr,n,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<n;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<n;i++)
{
printf(" %d ",arr[i]);
} }
```

```
int fact(int k)
{
int f = 1;
int i = 0;
for(i=1;i<k+1;i++)
    f = f*i;
return f;
}
```

```
int main()
{
int n = 0;
int i;
int j;
int z = 0;
printf("Johnson trotter algorithm \n");
printf("Enter a number\n");
scanf("%d",&n);
int arr[n],d[n];
```

```
z = fact(n);
printf("Total permutations = %d",z);
printf("\nPermutations: \n");
for(i=0;i<n;i++)
{
d[i] = 0;
arr[i] = i+1;
printf(" %d ",arr[i]);
}
printf("\n");
for(j=1;j<z;j++) {
    permut(arr,d,n);
    printf("\n");
}
return 0;
}
```

OUTPUT :

```
C:\Users\STUDENT\jt\bin\Debug\jt.exe
Johnson trotter algorithm
Enter a number
3
Total permutations = 6
Permutations:
1 2 3
1 3 2
3 1 2
3 2 1
2 3 1
2 1 3

Process returned 0 (0x0)   execution time : 2.750 s
Press any key to continue.
```