# University of Kalyani

**Department of Engineering & Technological Studies**

Kalyani, West Bengal, Pin code - 741245


## Department of Information Technology

**Name:** Priyanshu Maitra

**Reg. No:**

**Roll No:**

**Subject:** DSA Assignment - 2

**Paper Code:** IT302

**Semester:** 3*rd*

2022 - 23

# Q1. Write a program to implement all the operations of a stack using an array.

## Program Code:

```
#include <stdio.h>
int stack[100],i,j,choice=0,n,top=-1;
void push();
void pop();
void show();
void main (){
   printf("Enter the Stack Size(Max=100): ");
   scanf("%d",&n);
   while(choice != 4){
      printf("----Stack Menu----\n");
      printf("\n1.PUSH\n2.POP\n3.SHOW\n4.EXIT");
      printf("\n Enter your choice: \n");
      scanf("%d",&choice);
      switch(choice)
      {
         case 1:{
            push();
            break;
         }
          case 2:{
            pop();
            break;
         }
         case 3:{
            show();
            break;
         }
         case 4:{
            printf("Exiting....");
            break;
         }
         default:{
            printf("Please Enter valid choice!");
         }
      };
   }
}
```

```
void push (){
   int val;
   if (top == n )
   printf("\n Overflow");
   else{
      printf("Enter the value: ");
      scanf("%d",&val);
      top = top +1;
      stack[top] = val;
   }
}
void pop (){
   if(top == -1)
   printf("Underflow");
   else
   top = top -1;
}
void show(){
   for (i=top;i>=0;i--){
      printf("%d\n",stack[i]);
   }
   if(top == -1){
      printf("Stack is empty.");
   }
}
```

**Output:**

```
Enter the Stack Size(Max=100): 20
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
1
Enter the value: 23
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
1
Enter the value: 45
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
1
Enter the value: 66
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
3
66
45
23
```

```
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
2
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
3
45
23
----Stack Menu----

1.PUSH
2.POP
3.SHOW
4.EXIT
 Enter your choice:
4
```

# Q2. Write a program to implement all the operations of a queue using an array.

## Program Code:

```
#include <stdio.h>
#include <stdlib.h>
#define maxsize 5
void insert();
void delete ();
void display();
int front = -1, rear = -1;
int queue[maxsize];
void main(){
   int choice;
   while (choice != 4){
```

```
        printf("\n----Queue Menu----\n");
        printf("\n1.Insert Element\n2.Delete Element\n3.Display Queue\n4.EXIT\n");
        printf("\nEnter your choice: ");
        scanf("%d", &choice);
        switch (choice){
        case 1:
            insert();
            break;
        case 2:
            delete ();
            break;
        case 3:
            display();
            break;
        case 4:
            exit(0);
            break;
        default:
            printf("\nEnter valid choice!\n");
        }
    }
}
void insert(){
    int item;
    printf("\nEnter the element: \n");
    scanf("\n%d", &item);
    if (rear == maxsize - 1){
        printf("\nOVERFLOW\n");
        return;
    }
    if (front == -1 && rear == -1){
        front = 0;
        rear = 0;
    }
    else{
        rear = rear + 1;
    }
    queue[rear] = item;
    printf("\nValue Inserted.");
}
void delete (){
    int item;
    if (front == -1 || front > rear){
        printf("\nUNDERFLOW\n");
```

```
        return;
    }
    else{
        item = queue[front];
        if (front == rear){
            front = -1;
            rear = -1;
        }
        else{
            front = front + 1;
        }
        printf("\nValue deleted ");
    }
}
void display(){
    int i;
    if (rear == -1){
        printf("\nEmpty queue\n");
    }
    else{
        printf("\nprinting values .....\n");
        for (i = front; i <= rear; i++){
            printf("\n%d\n", queue[i]);
        }
    }
}
```

## Output:

```
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 1

Enter the element:
101

Value Inserted.
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 1

Enter the element:
102

Value Inserted.
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 1

Enter the element:
105

Value Inserted.
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 3

printing values .....

101

102

105
```

```
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 2

Value deleted
----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 3

printing values .....

102

105

----Queue Menu----

1.Insert Element
2.Delete Element
3.Display Queue
4.EXIT

Enter your choice: 4
```