Practical-6

1. Implement the following functionalities of the Circular queue using Arrays:

a. isFull – to check if the queue is full or not.

b. isEmpty – to check if the queue is empty or not.

c. enqueue – to insert the element in the queue.

d. dequeue – to delete the element from the queue.

e. front and rear – to print the front and rear element of the queue.

Aim:

Implementation of circular queue.

Theory:

In this program we implement circular queue by reseting the values of front and rear according to the situation and we also reference to address to help us save memory.

Code:

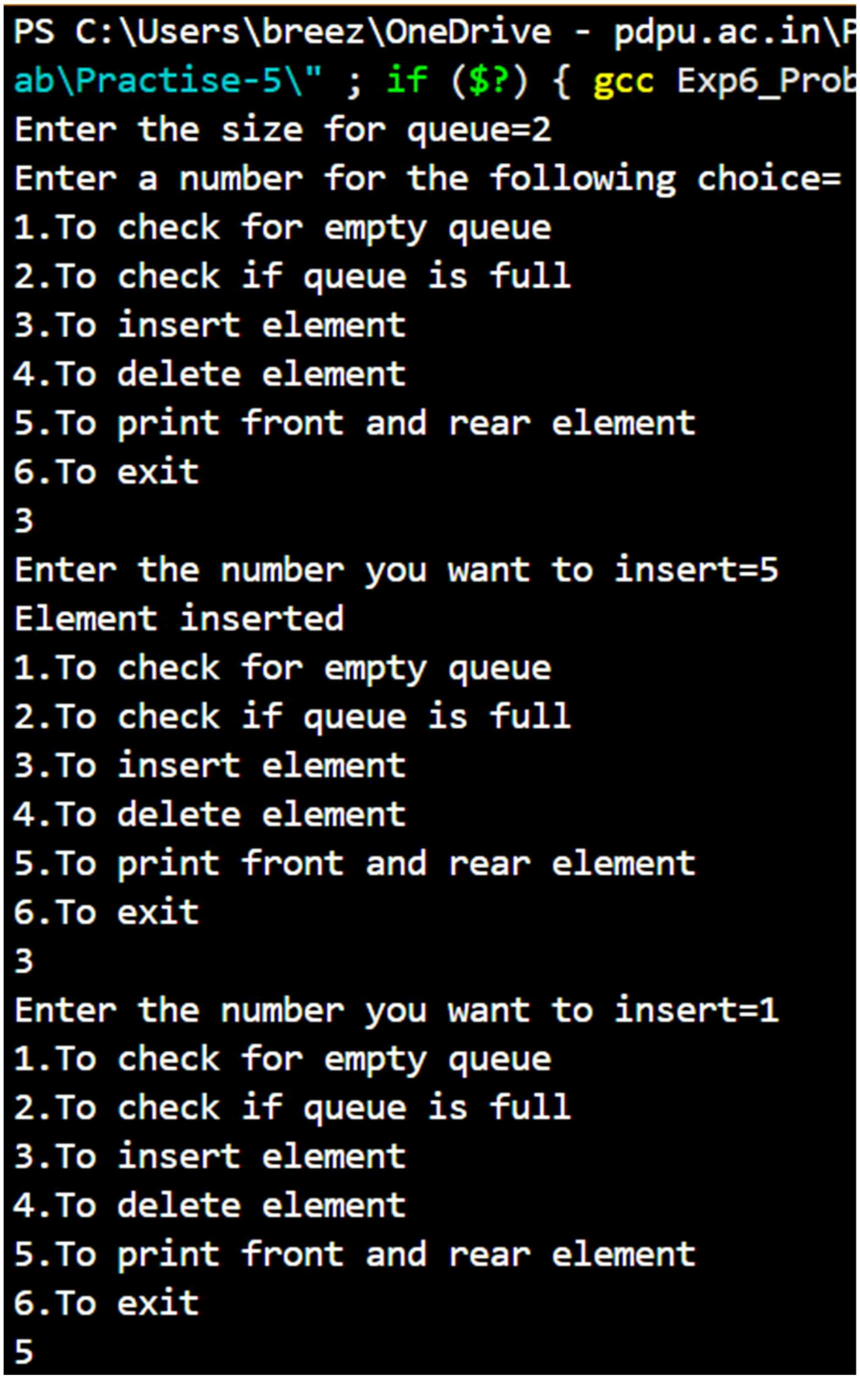
```
#include<stdio.h>
#include<stdlib.h>

struct queue
{
   int f,r,size; // Here r is pointing to next address not the last element address
   int * array;
};

struct queue * createQueue(int size)
{
   struct queue *q=(struct queue *)malloc(sizeof(struct queue));
   q->f=-1;
   q->r=-1;
   q->size=size;
   q->array=(int *)malloc(sizeof(int)*size);
   return q;
};

int isEmpty(struct queue *q)
{
   if(q->f==-1)
   {
      return 0;
   }
   return 1;
}

int isFull(struct queue *q)
{
   if(q->r-1==q->size-1 && q->f==0)
   {
      return 0;
   }
   else if(q->f==(q->r-1)% q->size)
   {
      return 0;
   }
   return 1;
}

int Enqueue(struct queue *q)
{
   int item;
```

```
    printf("Enter the number you want to insert=");
    scanf("%d",&item);
    if(isEmpty(q)==0)
    {
        q->f=0;
        q->r=1;
        q->array[q->f]=item;
        printf("Element inserted\n");
    }
    else if(q->r<=q->size-1)
    {
        q->array[q->r]=item;
        q->r++;
    }
    else
    {
        q->r=0;
        q->array[q->r]=item;
        q->r++;
    }
    return 0;
}

int Dequeue(struct queue *q)
{
    if(isEmpty(q)==0)
    {
        printf("No element to delete/dequeue\n");
    }
    else if(q->f==q->size-1)
    {
        q->f=0;
    }
    else
    {
        printf("The element %d is deleted \n",q->array[q->f]);
        q->f++;
    }
}

int print(struct queue *q)
{
    printf("The front element is %d\n",q->array[q->f]);
    printf("The rear element is %d\n",q->array[q->r-1]);
}

int main()
{
    int size,i;
    printf("Enter the size for queue=");
    scanf("%d",&size);
    struct queue *q=createQueue(size);
    printf("Enter a number for the following choice=\n");
    while(1)
    {
        printf("1.To check for empty queue \n2.To check if queue is full \n3.To insert element \n4.To delete element \n5.To print front and rear element \n6.To exit\n");
        scanf("%d",&i);
```

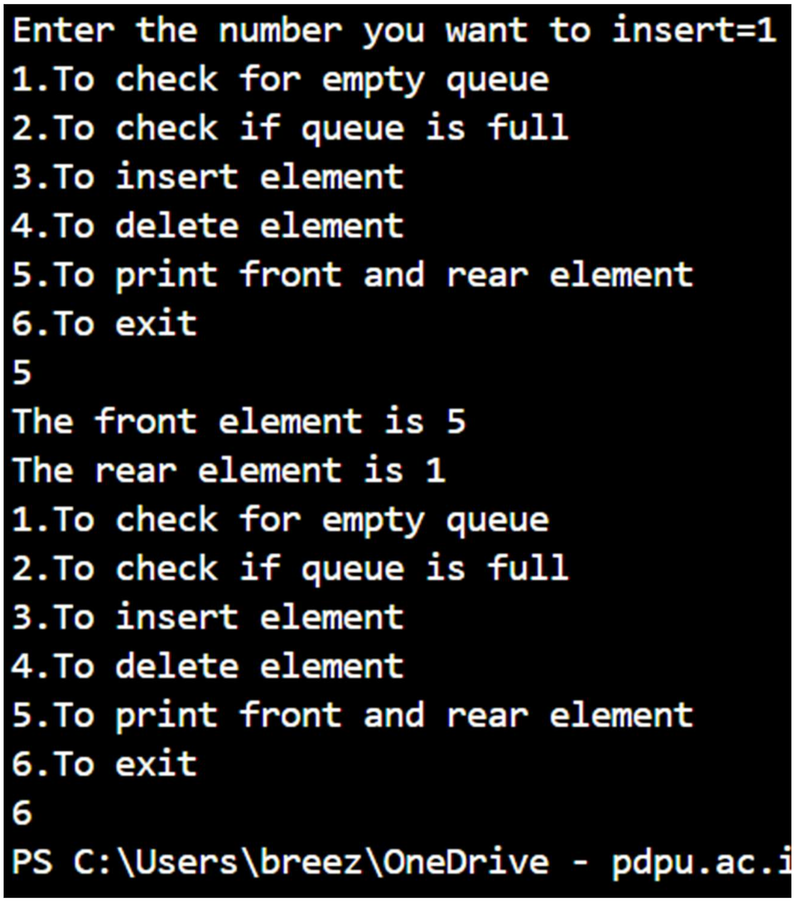
```
switch(i)
{
  case 1:
    if(isEmpty(q)==0)
    {
      printf("The queue is empty\n");
    }
    else
      printf("The queue is not empty\n");
    break;
  case 2:
    if(isFull(q)==0)
    {
      printf("The queue is full\n");
    }
    else
      printf("The queue is not full\n");
    break;
  case 3:
    Enqueue(q);
    break;
  case 4:
    Dequeue(q);
    break;
  case 5:
    print(q);
    break;
  case 6:
    exit(0);
```

```
        break;
      default:
        printf("Invalid input");
    }
  }
}
```

Output:



```
PS C:\Users\breez\OneDrive - pdpu.ac.in\P
ab\Practise-5\" ; if ($?) { gcc Exp6_Prob
Enter the size for queue=2
Enter a number for the following choice=
1.To check for empty queue
2.To check if queue is full
3.To insert element
4.To delete element
5.To print front and rear element
6.To exit
3
Enter the number you want to insert=5
Element inserted
1.To check for empty queue
2.To check if queue is full
3.To insert element
4.To delete element
5.To print front and rear element
6.To exit
3
Enter the number you want to insert=1
1.To check for empty queue
2.To check if queue is full
3.To insert element
4.To delete element
5.To print front and rear element
6.To exit
5
```



```
Enter the number you want to insert=1
1.To check for empty queue
2.To check if queue is full
3.To insert element
4.To delete element
5.To print front and rear element
6.To exit
5
The front element is 5
The rear element is 1
1.To check for empty queue
2.To check if queue is full
3.To insert element
4.To delete element
5.To print front and rear element
6.To exit
6
PS C:\Users\breez\OneDrive - pdpu.ac.i
```

Link for all code:

https://github.com/PanavPatel06/DSA-Lab/tree/main/Practise-5