DSA LAB – 8

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Circular Queue:

Code:

```
#include<iostream>
using namespace std;

#define SIZE 10

class CQueue{
   int array[SIZE];
   int rear;
   int front;

   public:
   CQueue(){
   rear = front = -1;
}

//function to check if queue is full
bool isFull(){
   if(front == 0 && rear == SIZE - 1){
      return true;
   }
   if(front == rear + 1) {
      return true;
   }
   return false;
}

//function to check if queue is empty
bool isEmpty(){
   if(front == -1) {
      return true;
   }
   else {
      return false;
   }
}
//declaring insert_q, delete_q, display_q and size functions
void insert_q(int x);
   int delete_q();
   void display_q();
   int size();
};

// function to insert element to queue
void CQueue :: insert_q(int x){
   if(isFull()){
      cout << "Queue is full";
      cout << "Queue OVERFLOW" << endl;
   }
   else{
      if(front == -1){
         front = 0;
      }
      rear = (rear + 1) % SIZE;
      // inserting the element
      array[rear] = x;
   }
}
```

```
// function to delete element from queue
int CQueue :: delete_q()
{
   int y;
   if(isEmpty()){
      cout << "Queue is empty" << endl;
      cout << "Queue UNDERFLOW" << endl;
      return 0;
   }
   else{
      y = array[front];
      cout << "Deleted value from the queue is " << y << endl;
      if(front == rear){
         // only one element in queue, reset queue after removal
         front = -1;
         rear = -1;
      }
      else{
         front = (front+1) % SIZE;
      }
      //cout << "Deleted value from the queue is " << array[front];
      return(y);
   }
}

// function to display elements of Circular Queue
void CQueue :: display_q()
{
   int i;
   if(isEmpty()) {
      cout << "Empty Queue" << endl;
   }
   else{
      cout << "Front -> " << front;
      cout << "\nElements -> ";
      for(i = front; i != rear; i= (i+1) % SIZE){
         cout << array[i] << "\t";
      }
      cout << array[i];
      cout << "\nRear -> " << rear << endl;
   }
}

int CQueue :: size()
{
   if(rear >= front){
      return (rear - front) + 1;
   }
   else{
      return (SIZE - (front - rear) + 1);
   }
}

int main()
{
   CQueue q1;
   int choice;
   //Menu of queue operations
   cout << "==================Menu==================\n";
   cout << "1. Insert element to queue\n";
   cout << "2. Delete element from queue\n";
   cout << "3. Display elements of queue\n";
   cout << "4. EXIT\n";
   cout << "========================================\n";
   while(1){
      cout << "\nEnter your choice to perform : ";
      cin >> choice;
```

```
switch(choice)
{
case 1:
   int v;
   cout << "Enter value to insert : ";
   cin >> v;
   q1.insert_q(v);
   break;
case 2:
   q1.delete_q();
   break;
case 3:
   cout << "---Queue elements---\n";
   q1.display_q();
   cout << "--------------------\n";
   break;
case 4:
   return 0;
default:
   cout << "Enter valid choice...!!!\n";
   break;
      }
   }
   return 0;
}
```

Input & Output:

```
PS C:\Users\DELL\OneDrive\Desktop\Labs> cd "c:\Users\DELL\OneDrive\Desktop\Labs\DSA LAB\LAB 8\" ; if ($?) { g++ circular_queue.cpp -o circular_queue } ; if ($?
) { .\circular_queue }
==================Menu==================
1. Insert element to queue
2. Delete element from queue
3. Display elements of queue
4. EXIT
========================================

Enter your choice to perform : 1
Enter value to insert : 5

Enter your choice to perform : 1
Enter value to insert : 10

Enter your choice to perform : 1
Enter value to insert : 15

Enter your choice to perform : 1
Enter value to insert : 20

Enter your choice to perform : 1
Enter value to insert : 25

Enter your choice to perform : 1
Enter value to insert : 30

Enter your choice to perform : 3
---Queue elements---
Front -> 0
Elements -> 5   10      15      20      25      30
Rear -> 5
--------------------

Enter your choice to perform : 2
Deleted value from the queue is 5

Enter your choice to perform : 2
Deleted value from the queue is 10

Enter your choice to perform : 3
---Queue elements---
Front -> 2
Elements -> 15  20      25      30
Rear -> 5
--------------------

Enter your choice to perform : 4
PS C:\Users\DELL\OneDrive\Desktop\Labs\DSA LAB\LAB 8>
```

Linear Queue:

Code:

```
#include<iostream>
using namespace std;

#define SIZE 10

class Queue{
   int array[SIZE];
   int rear;
   int front;
   public:
   Queue(){
      rear = front = -1;
   }
   //declaring insert, delete, search and display functions
   void insert_q(int x);
   int delete_q();
   void search_q(int x);
   void display_q();
};

//function to insert element to queue
void Queue :: insert_q(int x){
   if(front == -1) {
      front++;
   }
   if(rear == SIZE-1){
      cout << "Queue OVERFLOW\n";
   }
   else{
      array[++rear] = x;
   }
}

//function to remove element from queue
int Queue :: delete_q(){
   if(front > rear){
      cout << "Queue UNDERFLOW\n";
   }
   else{
      cout << "Deleted value from queue is " << array[front] << endl;
   }
   return array[++front];
}

//function to search for array element in queue
void Queue :: search_q(int x){
   int flag = 0;
   if(front == rear){
      cout << "The Queue is empty\n";
   }
   else{
      for(int i = front; i < SIZE; i++){
         if(array[i] == x){
            flag = 1;
            break;
         }
         else{
            flag = 0;
         }
      }
```

```
    }
    if(flag == 1){
        cout << "THE ELEMENT IS PRESENT IN THE QUEUE\n";
    }
    else{
        cout << "THE ELEMENT IS NOT PRESENT IN THE QUEUE\n";
    }
}

//function to display queue elements
void Queue :: display_q(){
    for(int i = front; i <= rear; i++){
        cout << array[i] << endl;
    }
}

int main(){
    Queue q1;
    int choice;
    //Menu of queue operations
    cout << "==================Menu==================\n";
    cout << "1. Insert element to queue\n";
    cout << "2. Delete element from queue\n";
    cout << "3. Search element in queue\n";
    cout << "4. Display elements of queue\n";
    cout << "5. EXIT\n";
    cout << "========================================\n";
    while(1){
        cout << "\nEnter your choice to perform : ";
        cin >> choice;
        switch(choice)
        {
        case 1:
            int v;
            cout << "Enter value to insert : ";
            cin >> v;
            q1.insert_q(v);
            break;
        case 2:
            q1.delete_q();
            break;
        case 3:
            int h;
            cout << "Enter element to search in queue : ";
            cin >> h;
            q1.search_q(h);
            break;
        case 4:
            cout << "---Queue elements---\n";
            q1.display_q();
            cout << "--------------------\n";
            break;
        case 5:
            return 0;
        default:
            cout << "Enter valid choice...!!!\n";
            break;
        }
    }
    return 0;
}
```

Input & Output:

```
PS C:\Users\DELL\OneDrive\Desktop\Labs> cd "c:\Users\DELL\OneDrive\Desktop\Labs\DSA LAB\LAB 8\" ; if ($?) { g++ queue.cpp -o queue } ; if ($?) { .\queue }
==================Menu==================
1. Insert element to queue
2. Delete element from queue
3. Search element in queue
4. Display elements of queue
5. EXIT
========================================

Enter your choice to perform : 1
Enter value to insert : 5

Enter your choice to perform : 1
Enter value to insert : 10

Enter your choice to perform : 1
Enter value to insert : 15

Enter your choice to perform : 1
Enter value to insert : 20

Enter your choice to perform : 1
Enter value to insert : 25

Enter your choice to perform : 1
Enter value to insert : 30

Enter your choice to perform : 4
---Queue elements---
5
10
15
20
25
30
--------------------

Enter your choice to perform : 2
Deleted value from queue is 5

Enter your choice to perform : 2
Deleted value from queue is 10

Enter your choice to perform : 4
---Queue elements---
15
20
25
30
--------------------

Enter your choice to perform : 3
Enter element to search in queue : 10
THE ELEMENT IS NOT PRESENT IN THE QUEUE

Enter your choice to perform : 3
Enter element to search in queue : 20
THE ELEMENT IS PRESENT IN THE QUEUE

Enter your choice to perform : 5
PS C:\Users\DELL\OneDrive\Desktop\Labs\DSA LAB\LAB 8>
```