LABWORK 3:

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INTRODUCTION:

In this lab work, we have implemented queue data structure using array and linked list. We have done following operations.

(a) enqueue(element): Adds an element into the queue

(b) dequeue(): Removes an element from the queue

(c) isEmpty(): Checks if the queue is empty

(d) isFull(): Checks if the queue is full

(e) front(): Gives the element at the front

(f) back(): Gives the element at the rear

IMPLEMENTATION:

Using array and linked list data structures, we have implemented the above operations.

In array, we have implemented circular queue,

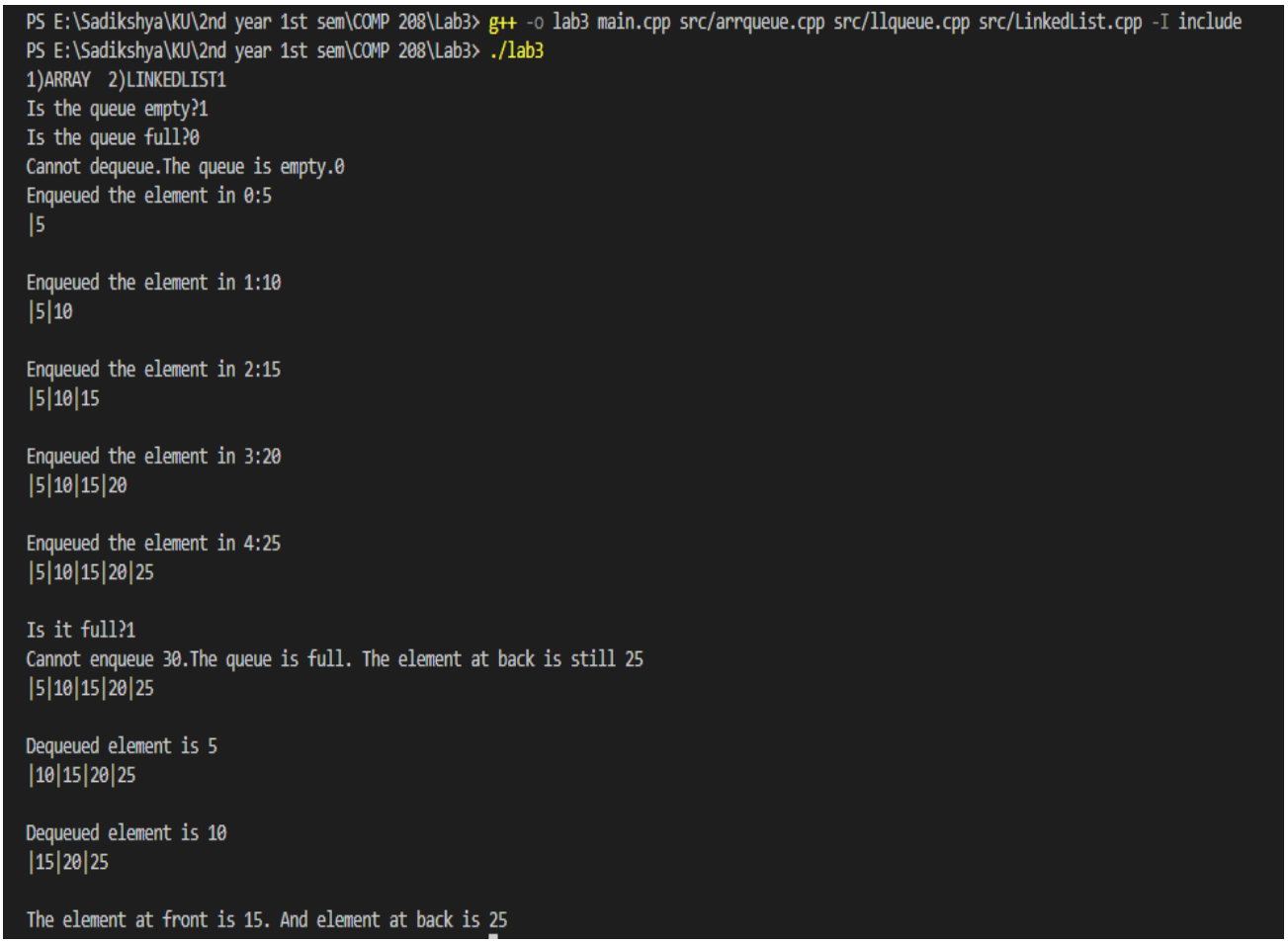
- We have checked whether the array is completely filled or not for isFull() operation.
- We have checked if array is empty for isEmpty() operation.
- We have added element to next empty index of array for enqueue(element) operation.
- We have removed first added element in array dequeue() operation.

In linked list,

- We have added new node to Tail of linkedlist for enqueue(element) operation.
- We have removed from head of linked list for dequeue() operation.
- We have returned Head element of linked list for front() operation.
- We have returned tail element of linked list for back() operation.
- We have checked if HEAD pointer is null or not, for isEmpty() operation.
- We have checked if there are declared number of nodes in the linked list or not, for isFull() operation.

OUTPUT:

Below inserted are the screenshots of output of the program.



```
PS E:\Sadikshya\KU\2nd year 1st sem\COMP 208\Lab3> g++ -o lab3 main.cpp src/arrqueue.cpp src/llqueue.cpp src/LinkedList.cpp -I include
PS E:\Sadikshya\KU\2nd year 1st sem\COMP 208\Lab3> ./lab3
1)ARRAY  2)LINKEDLIST1
Is the queue empty?1
Is the queue full?0
Cannot dequeue.The queue is empty.0
Enqueued the element in 0:5
|5

Enqueued the element in 1:10
|5|10

Enqueued the element in 2:15
|5|10|15

Enqueued the element in 3:20
|5|10|15|20

Enqueued the element in 4:25
|5|10|15|20|25

Is it full?1
Cannot enqueue 30.The queue is full. The element at back is still 25
|5|10|15|20|25

Dequeued element is 5
|10|15|20|25

Dequeued element is 10
|15|20|25

The element at front is 15. And element at back is 25
```

```
PS E:\Sadikshya\KU\2nd year 1st sem\COMP 208\Lab3> ./lab3
1)ARRAY  2)LINKEDLIST2
Is the queue empty?1
Is the queue full?0
Cannot dequeue.It is empty.0
Enqueued element : 5
|5| -|
Enqueued element : 10
|5| -|--->|10| -|
Enqueued element : 15
|5| -|--->|10| -|--->|15| -|
Enqueued element : 20
|5| -|--->|10| -|--->|15| -|--->|20| -|
Enqueued element : 25
|5| -|--->|10| -|--->|15| -|--->|20| -|--->|25| -|
Is it full?1

Cannot enqueue 30. It is full.The back element is still
25
|5| -|--->|10| -|--->|15| -|--->|20| -|--->|25| -|
Dequeued element : 5
|10| -|--->|15| -|--->|20| -|--->|25| -|
Dequeued element : 10
|15| -|--->|20| -|--->|25| -|
The element at front is 15. And element at back is 25
```