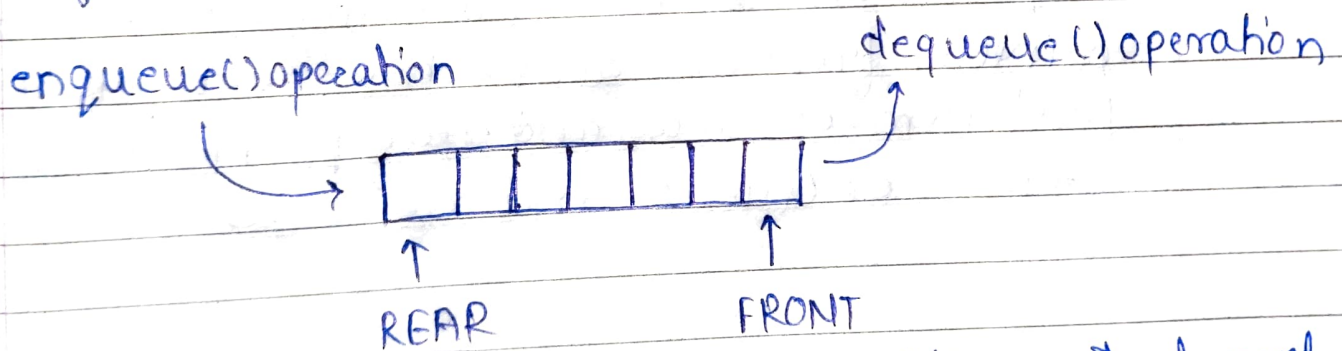


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DSA LAB 8 : Theory.

Q1. What is Queue? Explain Queue operation with neat diagrams.

→ A Queue is a linear structure which follows a particular order in which the operations are performed. The order is first in first out (FIFO). A good example of a queue is any queue consumers for a resource where the consumer that came first is served first.



enqueue() is the operation for adding an element.
dequeue() is the operation for removing an element.

Q2. Explain how Queue can be implemented as an ADT.

→ Queue can be implemented using:

- Array
- Linked List.

- Array implementation of Queue.

To implement a queue using array, create an array of size n and take two variables front and rear both of which will be initialized to 0 which means the queue is currently empty. Element rear is the index upto which the element are stored in the array and front is the index of the first element of the array.

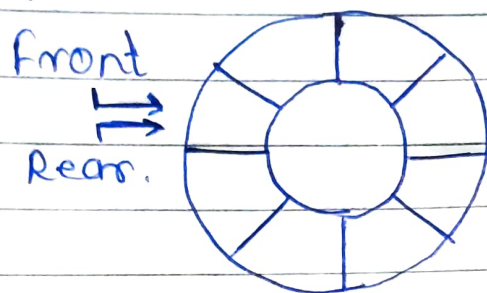
- Queue - Linked list Implementation.

The following two operation must be implemented efficiently.

In queue data structure, we maintain two pointers, front and rear. The front points the first item of queue and rear points to last item. enqueue and dequeue.

Q3. what is Circular Queue? Explain with Example.

→ A circular queue is a linear data structure in which the operations are performed based on FIFO (First in First out) Principle and the last position is connected back to the first position to make a circle.



• The real-life examples of the circular queue are:

1. Month in a year - Jan, Feb, Dec, Jan.
2. Days in a week - Mon-Sun-Mon.
3. Hours in a day.
4. Bottle capping system.

Eg:

		7	18	14	36	45	21	99	72
0	1	2	3	4	5	6	7	8	9

- In this queue, $front = 2$ and $rear = 9$.
 - Now, if you want to insert a new element, it cannot be done because the space is available only at the left of the queue.
 - IF $rear = MAX - 1$, then OVERFLOW condition exist.
 - This is the major drawback of a linear queue.
- Even if space is available, no insertion can be done once $rear$ is equal to $MAX - 1$

- This leads to wastage of space. In order to overcome this problem, we use circular queue.

- In circular queue, the first index comes right after the last index.

- A circular queue is Full, only when $\text{front} = 0$ and $\text{rear} = \text{Max} - 1$.