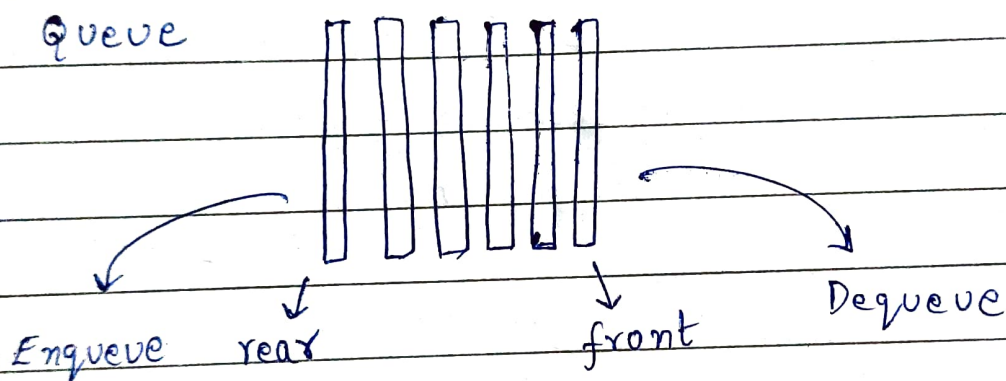


DSA LAB - 8

Theory

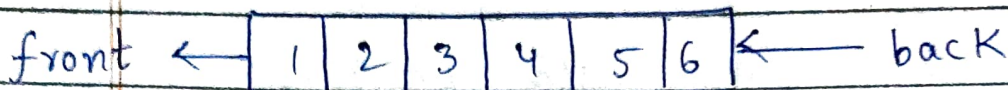
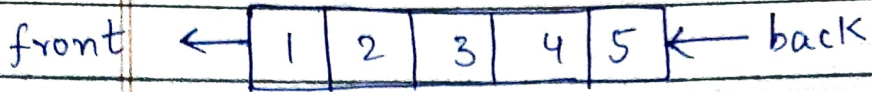
- 1) A. A queue is a linear data structure which follows a particular order in which the operations are performed. The order is First in First out (FIFO). A good example of queue is any queue of consumers for a resources where the consumer can that came first is served first.



2. Basic operations on queue:

* Enqueue:

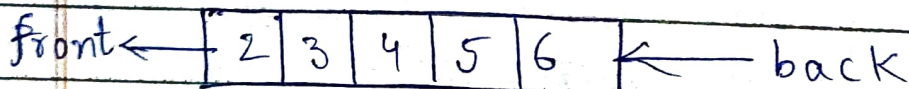
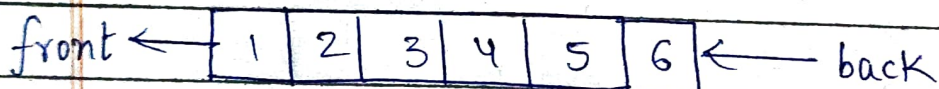
Enqueue means inserting an element in the queue. In a normal queue at a ticket counter, a new person goes and stands back. Similarly, a new element in a queue is inserted at the back of the queue.



Enqueue

* Dequeue :

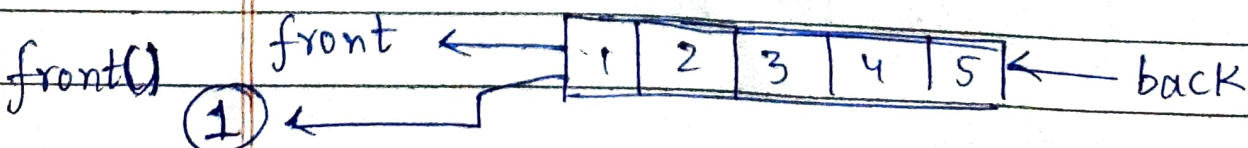
Dequeue means removing an element from the queue. Since queue follows the FIFO principle we need to remove the element of the queue which was inserted at first. So, the element inserted at first will be removed.



→ Dequeue

* Front :

This is similar to peek in stacks, it returns the value of element at front.



* IsEmpty():

This operation checks whether queue is empty or not. This helps to prevent operations on an empty queue.

2) A. Queue as an ADT can be implemented using arrays or linked list.

i) Array implementation:

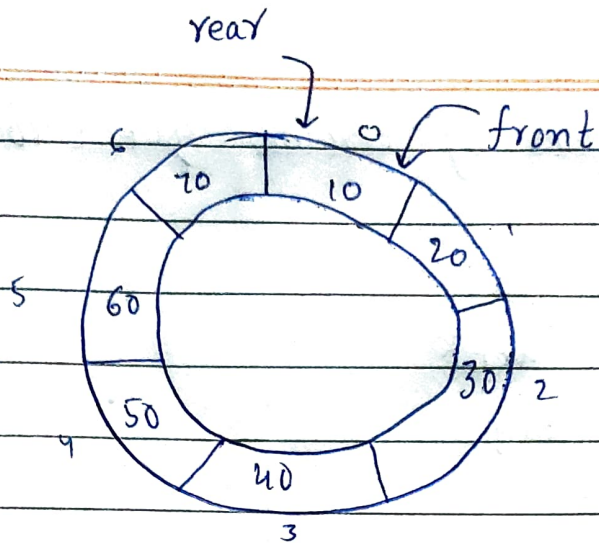
We can make two variables front and rear. Both are initialized to value (-1). If queue is not full then we can perform insert operation on queue. This list of queue elements when inserting new element can be accessed and maintained using rear variable. If queue is not empty the dequeue operation can be done. This operation is maintained using front element.

i) Linkedlist Implementation:

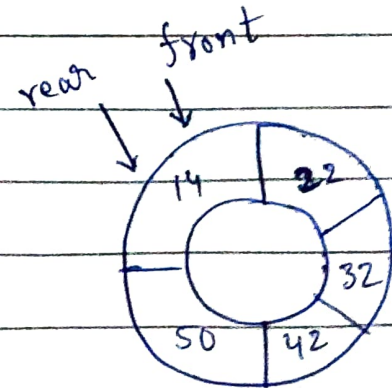
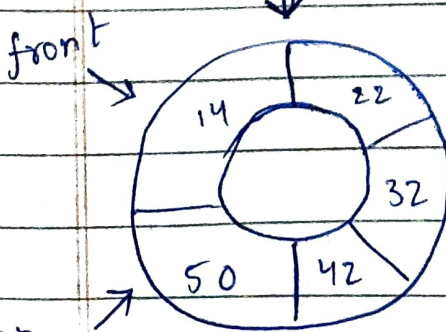
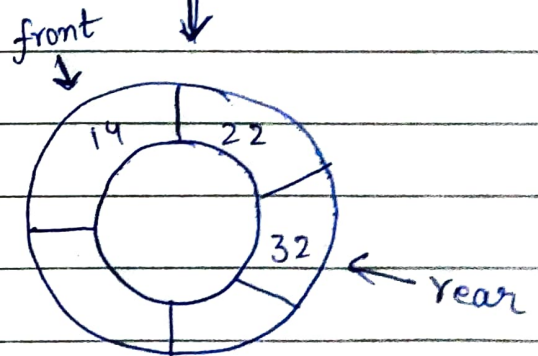
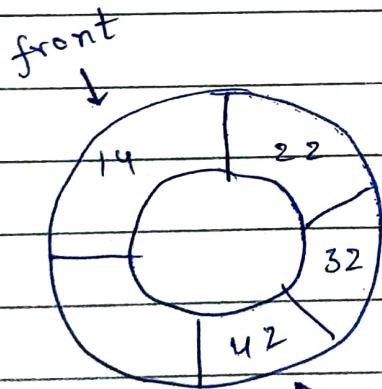
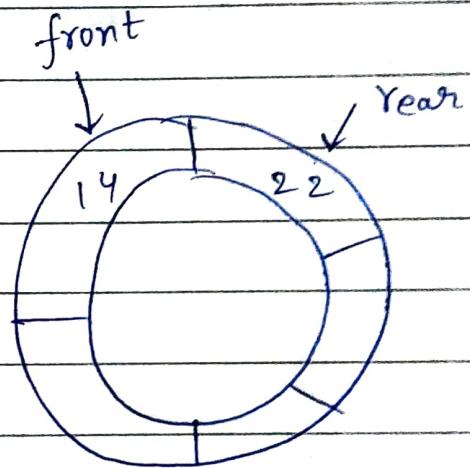
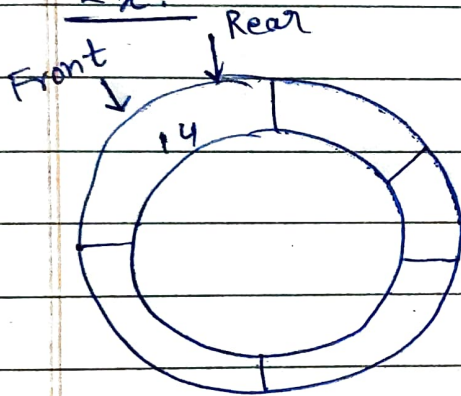
Queue are implemented using linked lists, because implementation using array work for only fixed number of data values. So, using linked lists can work for unlimited number of values. We create last inserted node always pointed by rear and the first node is always pointed by front. We create Node structure with two members data and next. Two node pointers front and rear set to NULL. Using rear and front pointers the operations like enqueue and dequeue are implemented and performed on queue.

3) A. Circular Queue is a linear data structure in which the operations are performed based on FIFO (First In First out) principle and last position is connected back to the first principle position to make a circle. It is also called 'Ring Buffer'.

In normal queue we cannot insert elements once the queue becomes full. But in circular queue its vice versa.



Ex:



rear

Real life examples of Circular queue are:

- Months in a year
- Days in a week
- Hours in a day
- Traffic lights
- Bottle capping system