(55) 13 (1)

Page No.
Date

* Experiment No. 13 *

Aim:-

A doubly ended queue (deque) is a linear list in which addition & deletion may be made at either end. Obtain a data representation mapping a deque into one dimensional array. Write c++ program to stimulate deque with function to add & delete element from either end of the deque.

hardware/software required:-

lab computer, c++ compiler.

prerequisite:-

Basic knowledge of c++, Queue, deque.

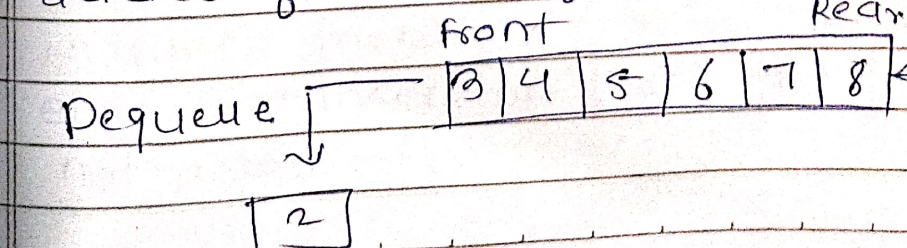
objective:-

to implement the concept of doubly ended queue (dequeue).

theory:-

Queue:

the queue is an abstract data type or linear data structure from which element can be inserted at rear (black) of the queue & element can be deleted from the front (head) of the queue.



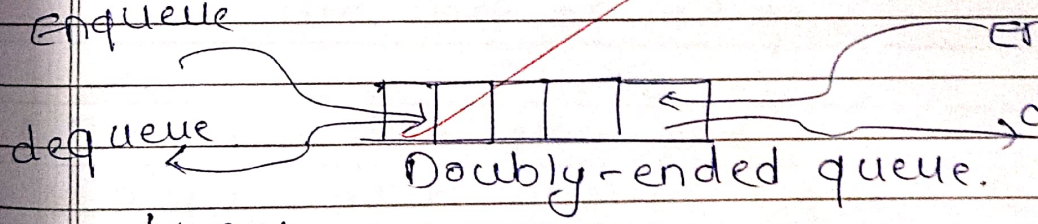
Page No.
Date

Deque :-

the doubly ended queue is an ADT that generalize a queue from which element can be inserted or deleted : either from both front or rear ends.

operation allowed in deque are :

1. Insert an element from front end.
2. Insert element from rear end.
3. delete element from front end.
4. Delete element from rear end
5. check if deque is empty
6. check if deque is full.



Doubly-ended queue.

types :-

1. Input restricted deque :

An input restricted deque is a queue in which deletion can be done from both the ends but insertion from the front will not allowed.

2. output restricted deque :-

An output restricted dequeue is a queue in which insertion can be done from both the ends but insertion from the front rear will not allowed.

Algorithm:-

step 1: Include all the header files & define a constant 'SIZE' with specific value.

step 2: Declare all use defined functions used in deque implementations.

step 3: Create one dimensional array with above defined size. (int deque (SIZE))

step 4: Define two integer variable 'front' & 'rear' & initalize both with '-1'.
int front, rear = -1.

step 5: Implement main method by displaying menu of operation list & make suitable function call to perform operation selected by the user on adeque.

① Insertion from front end:

step 1: check whether deque is full.

step 2: if it is full, terminate.

step 3: If not full, then

① If queue is initially empty.
then set front = rear = 0

② If the front in one first position then initalize front end.

② else decrement the front by 1.
front = front - 1.

step 4: Insert the desired element to index front.

Page No.
Date

(3) Insertion from rear end.
step 1: check if it full.
step 2: If full it aminate,
step 3: If not full,
① If queue is initially empty, set front = rear = 0
② or if the rear is at the last position of the deque then initialize rear to start.
③ Else increment the rear by 1 (rear = rear+1)
step 4: Insert the desired element to index rear is pointing.

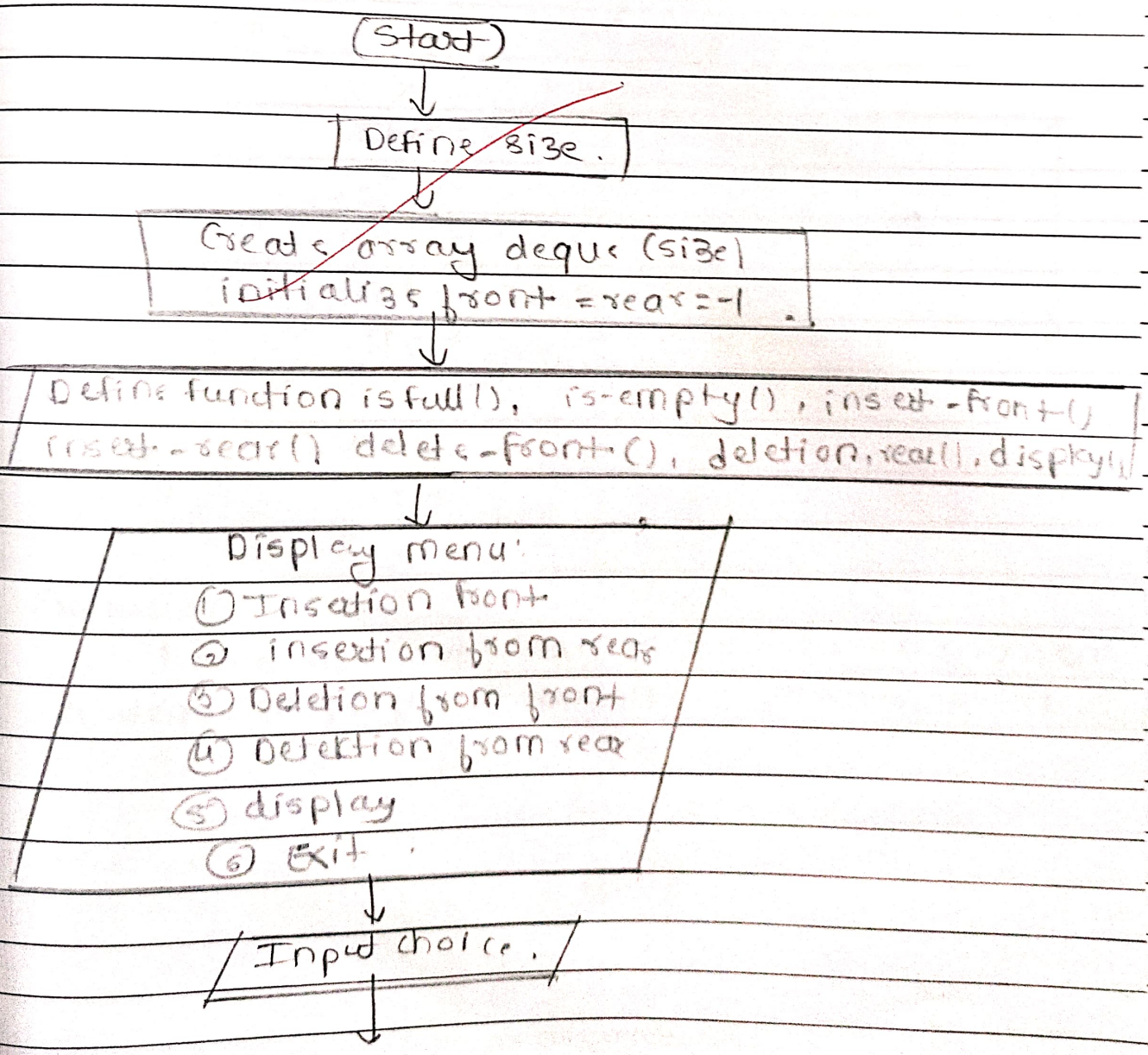
(3) Deletion from front.
step 1: check if it is empty.
step 2: If empty, terminate
step 3: If not empty.
① If the deque has only one element.
set front = rear = 1
② or if the front is at end, then set front = 0
③ Else increment the font by 1.

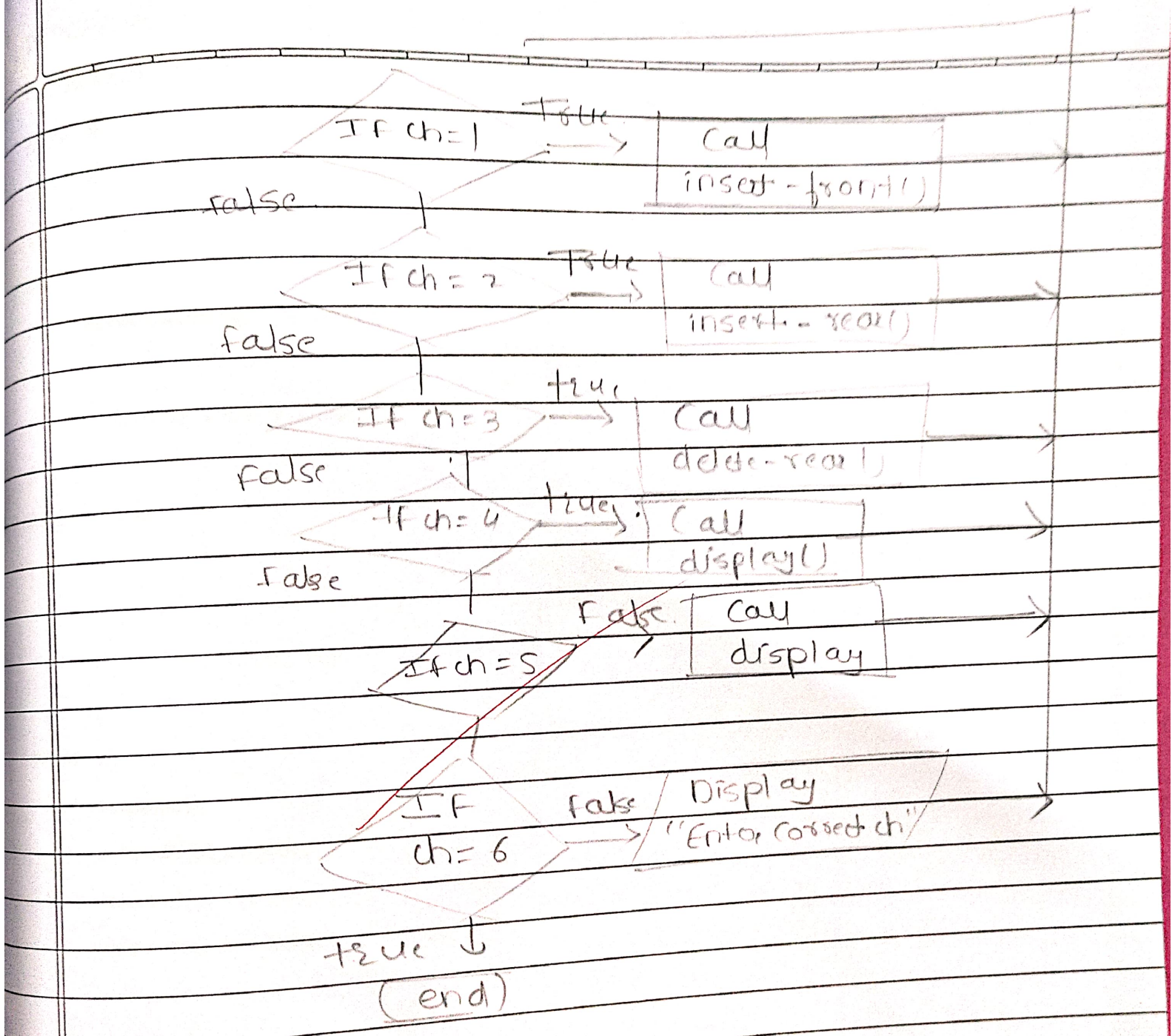
(4) Deletion from rear:
step 1: check if it empty.
step 2: if is empty, terminate.
step 3: If not empty.
step ① If the dequr has only one element set front = rear = -1.
② or if the rear is at the start then set rear = size - 1
③ Else decrement rear by 1.

Page No.
Date

5) Display:-
step 1: check whether the queue is empty.
step 2: if empty, terminate.
step 3: if not empty.
then apply for loop and print each element by increasing the index number.

Flow chart:-





Conclusion:

hence we have learned how to implement a deque a perform various operation on it.