***12)*** A double-ended queue(deque) is a linear list in which additions and deletions may be made at either end. Obtain a data representation mapping a deque into a one-dimensional array. Write C++ program to simulate deque with functions to add and delete elements from either end of the deque.

***CODE :-***

#include<iostream>

#include<stdio.h>

#define MAX 10

using namespace std;

struct que

{

int arr[MAX];

int front,rear;

};

void init(struct que \*q)

{

q->front=-1;

q->rear=-1;

}

void print(struct que q)

{

int i;

i=q.front;

while(i!=q.rear)

{

cout<<"\t"<<q.arr[i];

i=(i+1)%MAX;

}

cout<<"\t"<<q.arr[q.rear];

}

int isempty(struct que q)

{

return q.rear==-1?1:0;

}

int isfull(struct que q)

{

return (q.rear+1)%MAX==q.front?1:0;

}

void addf(struct que \*q,int data)

{

if(isempty(\*q))

{

q->front=q->rear=0;

q->arr[q->front]=data;

}

else

{

q->front=(q->front-1+MAX)%MAX;

q->arr[q->front]=data;

}

}

void addr(struct que \*q,int data)

{

if(isempty(\*q))

{

q->front=q->rear=0;

q->arr[q->rear]=data;

}

else

{

q->rear=(q->rear+1)%MAX;

q->arr[q->rear]=data;

}

}

int delf(struct que \*q)

{

int data1;

data1=q->arr[q->front];

if(q->front==q->rear)

init(q);

else

q->front=(q->front+1)%MAX;

return data1;

}

int delr(struct que \*q)

{

int data1;

data1=q->arr[q->rear];

if(q->front==q->rear)

init(q);

else

q->rear=(q->rear-1+MAX)%MAX;

return data1;

}

int main()

{

struct que q;

int data,ch;

init(&q);

while(ch!=6)

{

cout<<"\t\n1.Insert front"

"\t\n2.Insert rear"

"\t\n3.Delete front"

"\t\n4.Delete rear"

"\t\n5.Print"

"\t\n6.Exit";

cout<<"\nEnter your choice : ";

cin>>ch;

switch(ch)

{

case 1:

cout<<"\nEnter data to insert front : ";

cin>>data;

addf(&q,data);

break;

case 2:

cout<<"\nEnter the data to insert rear : ";

cin>>data;

addr(&q,data);

break;

case 3:

if(isempty(q))

cout<<"\nDequeue is empty!!!";

else

{

data=delf(&q);

cout<<"\nDeleted data is : "<<data;

}

break;

case 4:

if(isempty(q))

cout<<"\nDequeue is empty!!!";

else

{

data=delr(&q);

cout<<"\nDeleted data is : "<<data;

}

break;

case 5:

if(isempty(q))

cout<<"\nDequeue is empty!!!";

else

{

cout<<"\nDequeue elements are : ";

print(q);

}

break;

}

}

return 0;

}

***OUTPUT :-***



