Data Structures Lab (CSC204) **Session: Monsoon 2021-22**
III BTech (CSE) **Date: 28.09.2021**

Assignment-5 (Queue)

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1. Queue is one of the well-known linear data structure which follows First-In-First-Out (FIFO) order to perform various operations over data values stored in a queue. Write a program which creates a queue using array and performs different operations over the created queue as following:

   a) Write a function $\boldsymbol{Enqueue\_arr(x)}$ which takes integer $\boldsymbol{x}$ as input from the user and insert it into the queue.

   Sample Input:
   $Enter\ the\ number\ of\ elements$: 7
   $Elements\ to\ insert$: 5 6 8 9 3 2 4

   Sample Output:
   $Elements\ in\ queue$: 5 6 8 9 3 2 4

   b) Write a function $\boldsymbol{Dequeue\_arr()}$ which removes the element from the queue and returns it.

   Sample Output:
   $Removed\ element$: 5
   $Elements\ in\ queue$: 6 8 9 3 2 4

   c) Write a function $\boldsymbol{Front\_arr()}$ which returns the front element of the queue.

   Sample Output:
   $Front\ element = 6$

   d) Write a function $\boldsymbol{boolean\_empty\_arr()}$ which returns true if the queue is empty; otherwise returns false.

   Sample Output:
   $false$

2. Queue is one of the well-known linear data structure which follows First-In-First-Out (FIFO) order to perform various operations over data values stored in a queue. Write a program which creates a queue using linked list and performs different operations over the created queue as following:

   a) Write a function $\boldsymbol{Enqueue\_ll(x)}$ which takes integer $\boldsymbol{x}$ as input from the user and insert it into the queue.

   Sample Input:
   $Elements\ to\ insert$: 5 6 8 9 3 2 4

   Sample Output:
   $Elements\ in\ queue$: 5 → 6 → 8 → 9 → 3 → 2 → 4

   b) Write a function $\boldsymbol{Dequeue\_ll()}$ which removes the element from the queue and returns it.

   Sample Output:
   $Removed\ element$: 5
   $Elements\ in\ queue$: 6 → 8 → 9 → 3 → 2 → 4

3. Write a program which creates a circular queue of size k and performs different operations over the created circular queue as following:

   Sample Input:
   $Enter\ the\ size\ of\ k$: 5

   a) Write a function $\boldsymbol{Insert\_cir(x)}$ which inserts an integer $\boldsymbol{x}$ into the circular queue.

   Sample Input:
   $Elements\ to\ insert$: 1 2 3 4 5

   Sample Output:
   $Elements\ of\ queue$: 1 2 3 4 5

   b) Write a function $\boldsymbol{Delete\_cir()}$ which deletes and returns an integer from the circular queue.

   Sample Output:
   $Elements\ of\ queue$: 2 3 4 5

c) Write a function $\boldsymbol{Get\_front\_cir}()$ which returns the front element from the circular queue.

Sample Output:
$Front\ element\ of\ queue$: 2

d) Write a function $\boldsymbol{Get\_rear\_cir}()$ which returns the rear element from the circular queue.

Sample Output:
$Rear\ element\ of\ queue$: 5

e) Write a function $\boldsymbol{Size\_cir}()$ which returns the current size of the circular queue.

Sample Output:
$Size\ of\ the\ circular\ queue$: 4

4. Given an integer k and a queue of integers, reverse the order of the first k elements of the queue, leaving the other elements in the same relative order.

Sample Input:
$Size\ of\ queue\ and\ k$: 9 4
$Elements\ in\ queue$: 10 20 30 40 50 60 70 80 90

Sample Output:
$Elements\ in\ queue$: 40 30 20 10 50 60 70 80 90