Problem 4: Implementation of Double Ended Queue

Data Structures Lab (CS111)

In this practice problem, you need to implement double ended queues using different approaches. This problem has two parts:

1. Create a double ended queue using doubly linked list. Implement the following functions:

   - *insertFront*(), *insertRear*(), *deleteFront*(), *deleteRear*(), *printElements*(). **[8 marks]**

2. Next, you need to implement a stretchable double ended queue using array. First you need to declare a big array of size 100. First implement a double ended circular queue using first 10 spaces of the array. Implement all the operations on that mentioned in the 1st part. Then whenever the double ended queue becomes full, increase the available size for the queue by 5 and make those spaces available for insertion at front and insertion at rear, i. e. you need to add the free space of size 5 at the middle of the already used space by the double ended queue. Thus, this operation requires movement of some of the elements of the already existing double ended queue. Similarly, while performing delete operations (both *deleteFront* and *deleteRear*) you need to check the number of current elements in the double ended queue. If number of current elements are less than (current available space - 6), you need to decrease the available space for the double ended queue by 5 and adjust the double ended queue accordingly. Write functions *stretchDeque*() and *reduceDeque*() to implement stretch and reduce size operations.
   [12 marks]