Data Structures, 2016
Lab Assignment #3

1. Create an ADT *Queue*. It is a list of integer values. The ADT Queue is specified by the following operations:

a.) enqueue(x): inserts an item x from the rear end.

b.) x = dequeue (): delete item from front end and return in x.

c.) i = isempty (): check whether the queue is empty or not? Function return 1 if empty otherwise 0.

Implement this Queue using the data structure "Array" and "Linked List, separately. Write a menu driven program for users to operate on this queue. *We have already discussed the implementation of this ADT using linear array, circular array and linked list. So try it at your home.*

Perform questions 2 and 3 in lab.

2. We discussed an ADT deque (double ended queue) in the class. Create this ADT and name it as *deck*. *deck* is specified by the following operations:

   a) create (deck): create an empty deque.
   b) enqueueFront (deck, x): inserts an item x at the front of deque.
   c) enqueueRear (deck, x): inserts an item x at the rear of deque.
   d) dequeueFront (deck): removes the item at front of the deque.
   e) dequeueRear (deck): removes the item at rear of the deque.
   f) isEmpty (deck): check whether the deque is empty or not?
   g) isFull (deck): check whether the deque is full or not?

Implement *deck* using the data structure "Array" and "Linked List", separately. Write a menu driven program for users to operate on deque.

3. Write a program in C to check whether the given string is palindrome or not using *deck* ADT.

Do the following question in weekend:

4. When a share of common stock of some company is sold, the capital gain (or, sometimes loss) is the difference between the share's selling price and the price originally paid to buy it. This rule is easy to understand for a single share, but if we sell multiple shares of stock bought over a long period of time, then we must identify the shares actually being sold. A standard accounting principles for identifying which shares of a stock were sold in such a case is to use a FIFO protocol – the shares are the ones that have been held the longest. For example, suppose we buy 100 shares at 20 Rs. each on day 1, 20 shares at 24 Rs, on day 2, 200 shares at 36 Rs. on day 3, and then sell 150 shares on day 4 at 30 Rs. each. Then applying the FIFO protocol means that of the 150 shares sold, the 100 were bought on day 1, 20 were bought on day 2, and 30 were bought on day 3. The capital gain in this case would therefore be 100*10 + 20*6 + 30*(-6) = 940 Rs. Write a program that takes as input a sequence of transactions of the form:

Buy x shares at y Rs each or **sell x share at y Rs. each**

Assuming that transactions occur on consecutive days and values x and y are integers. Given this input sequence, the output should be the total capital gain (or loss) for the entire sequence, using the FIFO protocol to identify shares.