National University
of Computer & Emerging Sciences

Student Name: _____ Roll No: _____

Program: BS (SE/AI) Examination: Sessional-I

Semester: Fall 2023 Marks: 40, Weightage: 15

Time Allowed : 1 hour Date: 23-09-2023

Course: CS2001 - Data Structures Instructor: Waqas Ali

NOTE: Attempt all questions.

1. Given an array-based list of integers. Write a function named **rearrangeList** that rearranges the elements of the array in such a way that there is one even number followed by one odd number, and this pattern continues throughout the entire array. You must achieve this without using any additional data structures (such as temporary arrays). **[CLO 1, 10 points]**

   For Example:

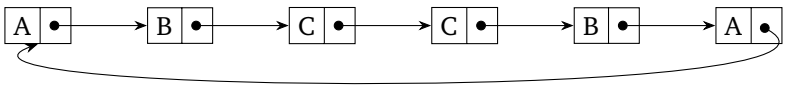
5	2	9	4	7	6	1	3	8

   After calling the function, the array arr should be rearranged as follows:

2	9	4	7	6	1	8	5	3

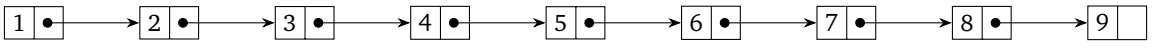
   Note: Use of index is not allowed, you can only use pointers (ZERO credit for index based solution). Consider that the input list will have equal number of even and odd values to avoid confusion.

2. Write a function **bool** isPalindrome() that determines whether a circular linked list is a palindrome or not. The function should return **true** if the list is a palindrome and **false** otherwise. Following is an example of a circular linked list that is a palindrome. **[CLO 3, 10 points]**

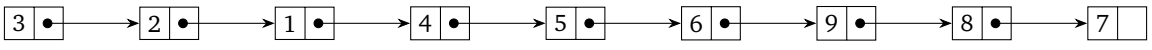
   

3. Consider that you are implementing a simple text editor application that supports basic text editing operations such as undo, redo, and character insertion. To implement the undo and redo functionality, you need to maintain a stack of previous text states. You are given the option to use either an array-based stack or a linked list-based stack to store these text states. Considering these factors, would you choose an array-based stack or a linked list-based stack for your text editor application? Provide justifications for your choice. **[CLO 3, 10 points]**

4. Assume you are given a linked list of integers. Write a function (called **reverseKNodes**, has one integer parameter **k**) reverses every alternate group of k nodes in the linked list. For example, if the linked list is as given below and k is 3. **[CLO 4, 10 points]**

   The resulting list should be:

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