Data Structures Lab (CSC204) **Session: Monsoon 2022-23**
III BTech (CSE) **Date: 21.08.2023**

Assignment-3 (Linked List-II)

---

1. In a circular singly linked list, the last node of the list contains a pointer to the first node of the list. We traverse a circular singly linked list until we reach the same node where from we started. The circular singly liked list has no beginning and no ending. There is no null value present in the next part of any of the nodes. You are required to do the following tasks:

   a) Write a function ***Create_CLL***() to create a circular singly linked list using the given input.

   Sample Input:
   Enter the data values of the nodes in the list: 5 9 3 7 8 2

   Sample Output: $5 \rightarrow 9 \rightarrow 3 \rightarrow 7 \rightarrow 8 \rightarrow 2$

   b) Write a function ***Insert_CLL***() to insert a new node with data value K at $(P\%N + 1))^{th}$ node position in the current linked list, where N is the current length of the list. The values of K and P (≥ 0) will be given at runtime. Consider that the position number of the first node is 1 and the position number sequence is circular in fashion, (i.e., $1, 2, \ldots, N, 1, 2, \ldots$).

   Sample Input:
   Enter the value of K: 1
   Enter the value of P: 7

   Sample Output: $5 \rightarrow 1 \rightarrow 9 \rightarrow 3 \rightarrow 7 \rightarrow 8 \rightarrow 2$

   c) Write a function ***Delete_CLL***() to delete all the odd/even positioned nodes from the current linked list. Consider that the position number of the first node is odd. Take the pattern of deletion (odd/even) from the user as input.

   Sample output:
   The original list is: $5 \rightarrow 1 \rightarrow 9 \rightarrow 3 \rightarrow 7 \rightarrow 8 \rightarrow 2$
   Pattern of deletion: odd
   New list after deletion is: $1 \rightarrow 3 \rightarrow 8$

2. Write a program that uses a linked list to represent a sentence, where each letter is stored in a node. A node with blank space ('$') will be present between two words. Now, do the following:

   a) Write a function ***Insert_word***() to insert a new word into the sentence at a specific word position. Take the word in a form of a linked list and the word position to insert from the user.

   Sample Input:
   Enter the string: IIT Dhanbad
   Enter the new word to insert: ISM
   Enter the word position of new word: 2

Sample Output:
Linked list before insertion: $I \rightarrow I \rightarrow T \rightarrow \$ \rightarrow D \rightarrow h \rightarrow a \rightarrow n \rightarrow b \rightarrow a \rightarrow d$

Linked list for the new word: $I \rightarrow S \rightarrow M$

Linked list after insertion: $I \rightarrow I \rightarrow T \rightarrow \$ \rightarrow I \rightarrow S \rightarrow M \rightarrow \$ \rightarrow D \rightarrow h \rightarrow a \rightarrow n \rightarrow b \rightarrow a \rightarrow d$

b) Write a function ***Delete_word***() to delete a specific word as given by the user from the current sentence.

Sample Input:
Enter the word to be deleted: *ISM*

Sample Output:
Linked list before deletion: $I \rightarrow I \rightarrow T \rightarrow \$ \rightarrow I \rightarrow S \rightarrow M \rightarrow \$ \rightarrow D \rightarrow h \rightarrow a \rightarrow n \rightarrow b \rightarrow a \rightarrow d$

Linked list after deletion: $I \rightarrow I \rightarrow T \rightarrow \$ \rightarrow D \rightarrow h \rightarrow a \rightarrow n \rightarrow b \rightarrow a \rightarrow d$