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**Assignment no 7**

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**S**

**ubject . Lab Data structure**

**Lab .7**

**Answer the following questions**

*Question no*

*Implement functions to insert node at first, last, Nth location, and centre of a doubly linked list. And display in order and display in reverse order.*

*#include <iostream>*

*using namespace std;*

*class Node {*

*public:*

*int data;*

*Node\* next;*

*Node\* prev;*

*Node(int val) : data(val), next(nullptr), prev(nullptr) {}*

*};*

*class DoublyLinkedList {*

*public:*

*Node\* head;*

*DoublyLinkedList() : head(nullptr) {}*

*void insertFirst(int val) {*

*Node\* newNode = new Node(val);*

*if (!head) {*

*head = newNode;*

*} else {*

*newNode->next = head;*

*head->prev = newNode;*

*head = newNode;*

*}*

*}*

*void insertLast(int val) {*

*Node\* newNode = new Node(val);*

*if (!head) {*

*head = newNode;*

*} else {*

*Node\* temp = head;*

*while (temp->next) temp = temp->next;*

*temp->next = newNode;*

*newNode->prev = temp;*

*}*

*}*

*void insertNth(int val, int n) {*

*if (n == 1) {*

*insertFirst(val);*

*return;*

*}*

*Node\* newNode = new Node(val);*

*Node\* temp = head;*

*for (int i = 1; temp != nullptr && i < n - 1; i++) {*

*temp = temp->next;*

*}*

*if (!temp) return;*

*newNode->next = temp->next;*

*if (temp->next) temp->next->prev = newNode;*

*temp->next = newNode;*

*newNode->prev = temp;*

*}*

*void insertCentre(int val) {*

*if (!head) return;*

*Node\* slow = head;*

*Node\* fast = head;*

*while (fast && fast->next) {*

*slow = slow->next;*

*fast = fast->next->next;*

*}*

*Node\* newNode = new Node(val);*

*newNode->next = slow->next;*

*if (slow->next) slow->next->prev = newNode;*

*slow->next = newNode;*

*newNode->prev = slow;*

*}*

*void displayForward() {*

*Node\* temp = head;*

*while (temp) {*

*cout << temp->data << " ";*

*temp = temp->next;*

*}*

*cout << endl;*

*}*

*void displayReverse() {*

*if (!head) return;*

*Node\* temp = head;*

*while (temp->next) temp = temp->next;*

*while (temp) {*

*cout << temp->data << " ";*

*temp = temp->prev;*

*}*

*cout << endl;*

*}*

*};*

*int main() {*

*DoublyLinkedList dll;*

*dll.insertFirst(10);*

*dll.insertFirst(20);*

*dll.insertLast(5);*

*dll.insertNth(15, 3);*

*dll.insertCentre(25);*

*dll.displayForward();*

*dll.displayReverse();*

*return 0;*

*}*

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