

# Rajalakshmi Engineering College

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Batch: 2028  
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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_MCQ

Attempt : 1  
Total Mark : 10  
Marks Obtained : 9

#### Section 1 : MCQ

1. Given the linked list: 5 -> 10 -> 15 -> 20 -> 25 -> NULL. What will be the output of traversing the list and printing each node's data?

**Answer**

5 10 15 20 25

**Status : Correct**

**Marks : 1/1**

2. The following function takes a singly linked list of integers as a parameter and rearranges the elements of the lists.

The function is called with the list containing the integers 1, 2, 3, 4, 5, 6, 7 in the given order. What will be the contents of the list after the function completes execution?

```

struct node {
    int value;
    struct node* next;
};

void rearrange (struct node* list) {
    struct node *p,q;
    int temp;
    if (! List || ! list->next) return;
    p=list; q=list->next;
    while(q) {
        temp=p->value; p->value=q->value;
        q->value=temp;p=q->next;
        q=p?p->next:0;
    }
}

```

**Answer**

2, 1, 4, 3, 6, 5, 7

**Status :** Correct

**Marks :** 1/1

3. The following function reverse() is supposed to reverse a singly linked list. There is one line missing at the end of the function.

What should be added in place of "/\*ADD A STATEMENT HERE\*/", so that the function correctly reverses a linked list?

```

struct node {
    int data;
    struct node* next;
};

static void reverse(struct node** head_ref) {
    struct node* prev = NULL;
    struct node* current = *head_ref;
    struct node* next;
    while (current != NULL) {
        next = current->next;
        /*ADD A STATEMENT HERE*/
    }
}

```

```
current->next = prev;
prev = current;
current = next;
}
/*ADD A STATEMENT HERE*/
}
```

**Answer**

```
*head_ref = prev;
```

**Status :** Correct

**Marks :** 1/1

4. Given a pointer to a node X in a singly linked list. If only one point is given and a pointer to the head node is not given, can we delete node X from the given linked list?

**Answer**

Possible if X is not last node.

**Status :** Correct

**Marks :** 1/1

5. Which of the following statements is used to create a new node in a singly linked list?

```
struct node {
    int data;
    struct node * next;
}
typedef struct node NODE;
NODE *ptr;
```

**Answer**

```
ptr = (NODE)malloc(sizeof(NODE));
```

**Status :** Wrong

**Marks :** 0/1

6. Consider an implementation of an unsorted singly linked list. Suppose it has its representation with a head pointer only. Given the representation,

which of the following operations can be implemented in  $O(1)$  time?

- i) Insertion at the front of the linked list
- ii) Insertion at the end of the linked list
- iii) Deletion of the front node of the linked list
- iv) Deletion of the last node of the linked list

**Answer**

I and III

**Status :** Correct

**Marks :** 1/1

7. Consider the singly linked list: 13 -> 4 -> 16 -> 9 -> 22 -> 45 -> 5 -> 16 -> 6, and an integer  $K = 10$ , you need to delete all nodes from the list that are less than the given integer  $K$ .

What will be the final linked list after the deletion?

**Answer**

13 -> 16 -> 22 -> 45 -> 16

**Status :** Correct

**Marks :** 1/1

8. Linked lists are not suitable for the implementation of?

**Answer**

Binary search

**Status :** Correct

**Marks :** 1/1

9. Consider the singly linked list: 15 -> 16 -> 6 -> 7 -> 17. You need to delete all nodes from the list which are prime.

What will be the final linked list after the deletion?

**Answer**

15 -> 16 -> 6

**Status :** Correct

**Marks :** 1/1

10. In a singly linked list, what is the role of the "tail" node?

**Answer**

It stores the last element of the list

**Status :** Correct

**Marks :** 1/1

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Janani is a tech enthusiast who loves working with polynomials. She wants to create a program that can add polynomial coefficients and provide the sum of their coefficients.

The polynomials will be represented as a linked list, where each node of the linked list contains a coefficient and an exponent. The polynomial is represented in the standard form with descending order of exponents.

##### ***Input Format***

The first line of input consists of an integer  $n$ , representing the number of terms in the first polynomial.

The following  $n$  lines of input consist of two integers each: the coefficient and the exponent of the term in the first polynomial.

The next line of input consists of an integer m, representing the number of terms in the second polynomial.

The following m lines of input consist of two integers each: the coefficient and the exponent of the term in the second polynomial.

### **Output Format**

The output prints the sum of the coefficients of the polynomials.

### **Sample Test Case**

Input: 3

2 2

3 1

4 0

3

2 2

3 1

4 0

Output: 18

### **Answer**

```
#include<stdio.h>
#include<stdlib.h>
typedef struct poly
{
    int coeff;
    int expon;
    struct poly*next;
}Node;
Node*new_node(int coeff , int expon)
{
    Node*new_node = (Node*)malloc(sizeof(Node));
    new_node->coeff = coeff;
    new_node->expon = expon;
    new_node->next = NULL;
    return new_node;
}
void insertNode(Node**head,int coeff,int expon)
{
    Node*temp=*head;
    if(temp==NULL)
```

```

{
    *head=new_node(coeff,expon);
    return;
}
while(temp->next!=NULL)
{
    temp=temp->next;
}
temp->next=new_node(coeff,expon);
}
int main()
{
    int n,coeff,expon;
    scanf("%d",&n);
    Node*poly1;
    Node*poly2;
    for(int i=0;i<n;i++)
    {
        scanf("%d%d",&coeff,&expon);
        insertNode(&poly1,coeff,expon);
    }
    scanf("%d",&n);
    for(int i=0;i<n;i++)
    {
        scanf("%d%d",&coeff,&expon);
        insertNode(&poly2,coeff,expon);
    }
    int sum =0;
    while(poly1!=NULL)
    {
        sum+=poly1->coeff;
        poly1 =poly1->next;
    }
    while(poly2!=NULL)
    {
        sum+=poly2->coeff;
        poly2=poly2->next;
    }
    printf("%d",sum);
}

```

**Status :** Correct

**Marks :** 10/10



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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Janani is a tech enthusiast who loves working with polynomials. She wants to create a program that can add polynomial coefficients and provide the sum of their coefficients.

The polynomials will be represented as a linked list, where each node of the linked list contains a coefficient and an exponent. The polynomial is represented in the standard form with descending order of exponents.

##### ***Input Format***

The first line of input consists of an integer  $n$ , representing the number of terms in the first polynomial.

The following  $n$  lines of input consist of two integers each: the coefficient and the exponent of the term in the first polynomial.

The next line of input consists of an integer m, representing the number of terms in the second polynomial.

The following m lines of input consist of two integers each: the coefficient and the exponent of the term in the second polynomial.

### **Output Format**

The output prints the sum of the coefficients of the polynomials.

### **Sample Test Case**

Input: 3

2 2

3 1

4 0

3

2 2

3 1

4 0

Output: 18

### **Answer**

```
#include<stdio.h>
#include<stdlib.h>
typedef struct poly
{
    int coeff;
    int expon;
    struct poly*next;
}Node;
Node*new_node(int coeff , int expon)
{
    Node*new_node = (Node*)malloc(sizeof(Node));
    new_node->coeff = coeff;
    new_node->expon = expon;
    new_node->next = NULL;
    return new_node;
}
void insertNode(Node**head,int coeff,int expon)
{
    Node*temp=*head;
    if(temp==NULL)
```

```

{
    *head=new_node(coeff,expon);
    return;
}
while(temp->next!=NULL)
{
    temp=temp->next;
}
temp->next=new_node(coeff,expon);
}
int main()
{
    int n,coeff,expon;
    scanf("%d",&n);
    Node*poly1;
    Node*poly2;
    for(int i=0;i<n;i++)
    {
        scanf("%d%d",&coeff,&expon);
        insertNode(&poly1,coeff,expon);
    }
    scanf("%d",&n);
    for(int i=0;i<n;i++)
    {
        scanf("%d%d",&coeff,&expon);
        insertNode(&poly2,coeff,expon);
    }
    int sum =0;
    while(poly1!=NULL)
    {
        sum+=poly1->coeff;
        poly1 =poly1->next;
    }
    while(poly2!=NULL)
    {
        sum+=poly2->coeff;
        poly2=poly2->next;
    }
    printf("%d",sum);
}

```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 4

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

As part of a programming assignment in a data structures course, students are required to create a program to construct a singly linked list by inserting elements at the beginning.

You are an evaluator of the course and guide the students to complete the task.

##### ***Input Format***

The first line of input consists of an integer N, which is the number of elements.

The second line consists of N space-separated integers.

##### ***Output Format***

The output prints the singly linked list elements, after inserting them at the beginning.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 5

78 89 34 51 67

Output: 67 51 34 89 78

### **Answer**

```
#include <stdio.h>
#include <stdlib.h>
```

```
struct Node {
    int data;
    struct Node* next;
};
```

```
void insertAtFront (struct Node** head, int activity) {
    struct Node* newnode = (struct Node*) malloc(sizeof(struct Node));
    newnode->data = activity;
    newnode->next = *head;
    *head = newnode;
}
```

```
void printList(struct Node* head) {
    while(head != NULL) {
        printf("%d ", head->data);
        head = head->next;
    }
}
```

```
int main(){
    struct Node* head = NULL;
```

```
    int n;
    scanf("%d", &n);
```

```
    for (int i = 0; i < n; i++) {
```

```
int activity;
scanf("%d", &activity);
insertAtFront(&head, activity);
}

printList(head);
struct Node* current = head;
while (current != NULL) {
    struct Node* temp = current;
    current = current->next;
    free(temp);
}

return 0;
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 5

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Imagine you are tasked with developing a simple GPA management system using a singly linked list. The system allows users to input student GPA values, insertion should happen at the front of the linked list, delete record by position, and display the updated list of student GPAs.

##### ***Input Format***

The first line of input contains an integer  $n$ , representing the number of students.

The next  $n$  lines contain a single floating-point value representing the GPA of each student.

The last line contains an integer position, indicating the position at which a student record should be deleted. Position starts from 1.

### **Output Format**

After deleting the data in the given position, display the output in the format "GPA: " followed by the GPA value, rounded off to one decimal place.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 4

3.8

3.2

3.5

4.1

2

Output: GPA: 4.1

GPA: 3.2

GPA: 3.8

### **Answer**

```
#include<stdio.h>
```

```
#include<stdlib.h>
```

```
typedef struct gpa{  
    float value;  
    struct gpa* next;  
}Node;
```

```
Node* newnode(float value) {  
    Node* newgpa = (Node*) malloc(sizeof(Node));  
    newgpa->value = value;  
    newgpa->next = NULL;  
    return newgpa;  
}
```

```
Node* insertAtStart(Node* head, float value) {  
    Node* newgpa = newnode(value);  
    newgpa->next = head;  
    return newgpa;  
}
```



```
void traverse(Node* head) {  
    while(head != NULL) {  
        printf("GPA: %.1f\n", head->value);  
        head = head->next;  
    }  
}
```

```
void deleteAtPosition(Node** head, int pos){  
    pos -= 1;  
    Node* temp = *head;  
    if(pos == 0) {  
        *head = temp->next;  
        free(temp);  
        return;  
    }  
    while(--pos){  
        temp = temp->next;  
    }  
    Node* temp1 = temp->next;  
    temp->next = temp->next->next;  
    free(temp1);  
}
```

```
int main(){  
    int n, pos;  
    float value;  
    scanf("%d", &n);  
  
    Node* head = NULL;  
    for(int i = 0; i < n; i++) {  
        scanf("%f", &value);  
        head = insertAtStart(head, value);  
    }  
  
    scanf("%d", &pos);  
    deleteAtPosition(&head, pos);  
    traverse(head);  
}
```

**Status : Correct**

**Marks : 10/10**

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 6

Attempt : 3  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

John is tasked with creating a program to manage student roll numbers using a singly linked list.

Write a program for John that accepts students' roll numbers, inserts them at the end of the linked list, and displays the numbers.

##### ***Input Format***

The first line of input consists of an integer N, representing the number of students.

The second line consists of N space-separated integers, representing the roll numbers of students.

##### ***Output Format***

The output prints the space-separated integers singly linked list, after inserting the roll numbers of students at the end.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 5

23 85 47 62 31

Output: 23 85 47 62 31

### **Answer**

```
struct Node* insertAtEnd(struct Node*head, int rollNumber) {
    struct Node* new_node = ( struct Node*)malloc(sizeof(struct Node));
    new_node->rollNumber = rollNumber;
    new_node->next = NULL;

    if (!head) return new_node;
    struct Node* temp = head;
    while (temp->next)
        temp = temp->next;
    temp->next = new_node;
    return head;
}

void display(struct Node* head) {
    struct Node* temp = head;
    while (temp) {
        printf("%d ", temp->rollNumber);
        temp = temp->next;
    }
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 7

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Dev is tasked with creating a program that efficiently finds the middle element of a linked list. The program should take user input to populate the linked list by inserting each element into the front of the list and then determining the middle element.

Assist Dev, as he needs to ensure that the middle element is accurately identified from the constructed singly linked list:

If it's an odd-length linked list, return the middle element. If it's an even-length linked list, return the second middle element of the two elements.

##### ***Input Format***

The first line of input consists of an integer n, representing the number of elements in the linked list.

The second line consists of n space-separated integers, representing the elements of the list.

### ***Output Format***

The first line of output displays the linked list after inserting elements at the front.

The second line displays "Middle Element: " followed by the middle element of the linked list.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5

10 20 30 40 50

Output: 50 40 30 20 10

Middle Element: 30

### ***Answer***

```
#include <stdio.h>
#include <stdlib.h>
struct Node {
    int data;
    struct Node* next;
};
```

// You are using GCC

```
struct Node* push(Node* head, int value)
{
    Node* newnode = (struct Node*) malloc(sizeof(struct Node));
    newnode->next = head;
    newnode->data = value;
    return newnode;
}
```

```
int printMiddle(struct Node* head)
```

```

{
    int len = 0;
    Node* temp = head;
    while(temp != NULL)
    {
        len++;
        temp = temp->next;
    }
    int pos = len/2;

    for(int i=0 ; i<pos ; i++)
    {
        head = head->next;
    }
    return head->data;
}

```

```

int main() {
    struct Node* head = NULL;
    int n;

    scanf("%d", &n);
    int value;

    for (int i = 0; i < n; i++) {
        scanf("%d", &value);
        head = push(head, value);
    }

    struct Node* current = head;
    while (current != NULL) {
        printf("%d ", current->data);
        current = current->next;
    }
    printf("\n");

```

```

    int middle_element = printMiddle(head);
    printf("Middle Element: %d\n", middle_element);

```

```

    current = head;

```

```
while (current != NULL) {  
    struct Node* temp = current;  
    current = current->next;  
    free(temp);  
}  
  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10