



DEPARTMENT OF COMPUTER ENGINEERING

Subject: - DSU	Subject Code: 313301
Semester: - III	Course: Computer Engineering
Laboratory No: L003	Name of Subject Teacher: Prof. Imran S.
Name of Student: Mohd Saad Khan	Roll Id: - 24203A0007
Experiment No:	14
Title of Experiment	*Write a C Program to Create Two Polynomials using a Linked List.

Aim: *Write a C Program to Create Two Polynomials using a Linked List.

Algorithm:

Step 1: Start

Step 2: Define a structure Node having three fields: coefficient (coeff), power (power), and pointer to the next node (next).

Step 3: Declare the functions:

createlinkedlist(int n) to create a polynomial linked list with n terms

createnode(int coeff, int power) to allocate memory for a new node

printList(struct Node* head) to display the polynomial

Step 4: In the main function, declare variables n1 and n2 for number of terms of two polynomials.

Step 5: Input the number of terms for the first polynomial (n1).

Step 6: Input the number of terms for the second polynomial (n2).

Step 7: Call createlinkedlist(n1) to create the first polynomial and store its head pointer in poly1.

Step 8: Call createlinkedlist(n2) to create the second polynomial and store its head pointer in poly2.

Step 9: Display the first polynomial using printList(poly1).

Step 10: Display the second polynomial using printList(poly2).

Step 11: End

Algorithm for createlinkedlist(int n)

Step 1: Initialize head and temp as NULL.

Step 2: If $n \leq 0$ then print message "Number of nodes should be greater than zero" and return NULL.

Step 3: Input coefficient and power for the first term.

Step 4: Create a new node using createnode(coeff, power) and assign it to head and temp.

Step 5: Repeat for $i = 2$ to n :

a) Input coefficient and power of the i th term

b) Create a new node using createnode(coeff, power)

c) Link it to the list using $\text{temp} \rightarrow \text{next} = \text{newNode}$

d) Move temp to $\text{temp} \rightarrow \text{next}$

Step 6: Return head

Algorithm for createnode(int coeff, int power)

Step 1: Allocate memory for a new node

Step 2: Assign coefficient and power to the node

Step 3: Set next = NULL

Step 4: Return new node pointer

Algorithm for printList(struct Node* head)

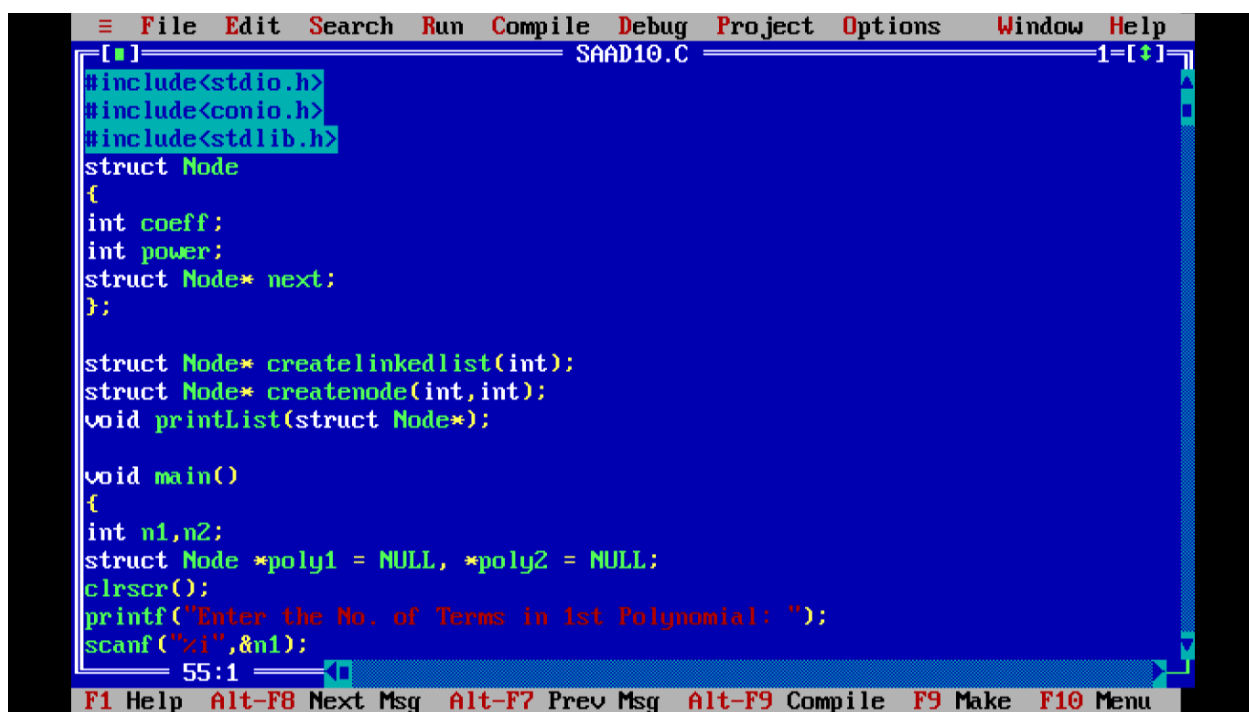
Step 1: Initialize temp = head

Step 2: While temp->next != NULL, print term in the form coeff X^power + and move temp to next

Step 3: Print the last term without +

Step 4: Stop

Code:



```

File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct Node
{
    int coeff;
    int power;
    struct Node* next;
};

struct Node* createlinkedlist(int);
struct Node* createnode(int,int);
void printList(struct Node*);

void main()
{
    int n1,n2;
    struct Node *poly1 = NULL, *poly2 = NULL;
    clrscr();
    printf("Enter the No. of Terms in 1st Polynomial: ");
    scanf("%d",&n1);
    55:1
F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu

```

```
≡ File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+/-]
printf("Enter the No. of Terms in 2nd Polynomial: ");
scanf("%i",&n2);
printf("\nPolynomial 1: \n");
poly1 = createlinkedlist(n1);
printf("\nPolynomial 2: \n");
poly2 = createlinkedlist(n2);
printf("\n1st Polynomial: \n");
printList(poly1);
printf("\n2nd Polynomial: \n");
printList(poly2);
getch();
}

struct Node* createlinkedlist(int n)
{
    int coeff,power,i;
    struct Node *head = NULL, *temp = NULL, *newNode = NULL;
    if(n<=0)
    {
        printf("Number of Nodes should be greater then 0...");
        return NULL;
    }
    42:78

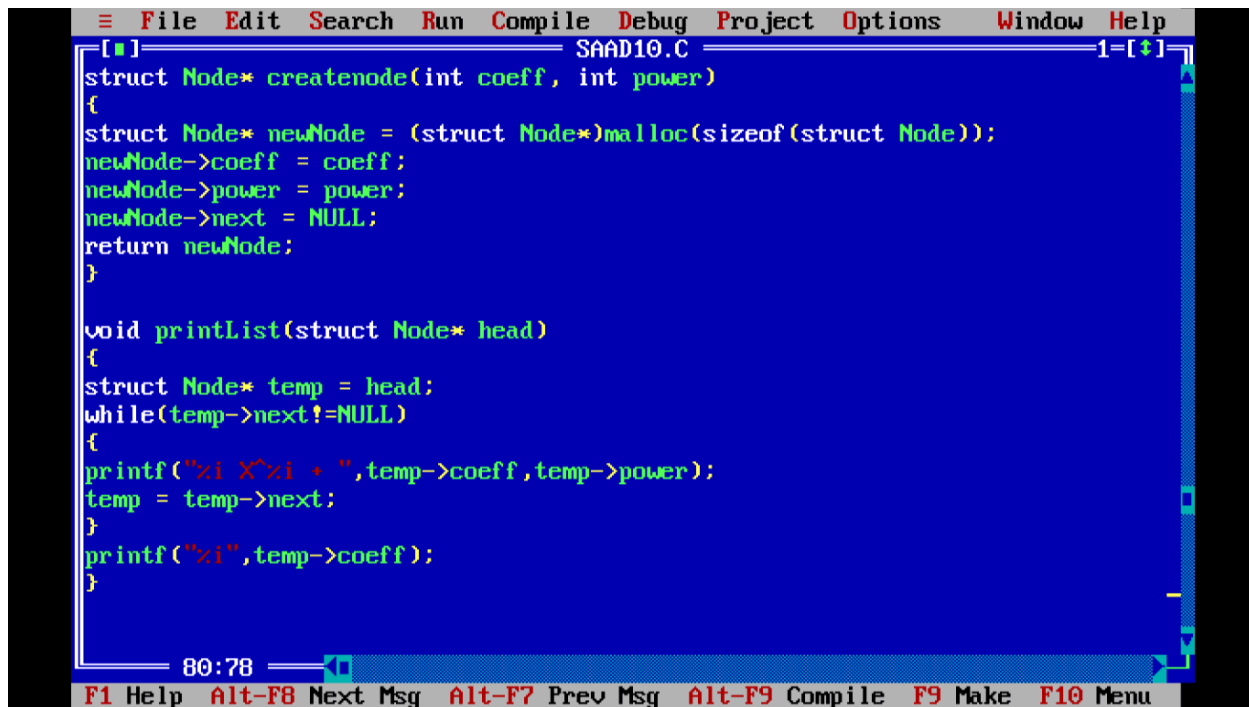
F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
≡ File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+/-]
return NULL;
}

printf("Enter Coefficient & Power for Term 1: ");
scanf("%i %i",&coeff,&power);
newNode = createnode(coeff,power);
head = newNode;
temp = newNode;

for(i=2;i<=n;i++)
{
    printf("Enter Coefficient & Power for Term %i: ",i);
    scanf("%i %i",&coeff,&power);
    newNode = createnode(coeff,power);
    temp->next = newNode;
    temp = temp->next;
}
return head;
}

struct Node* createnode(int coeff, int power)
    62:78

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```

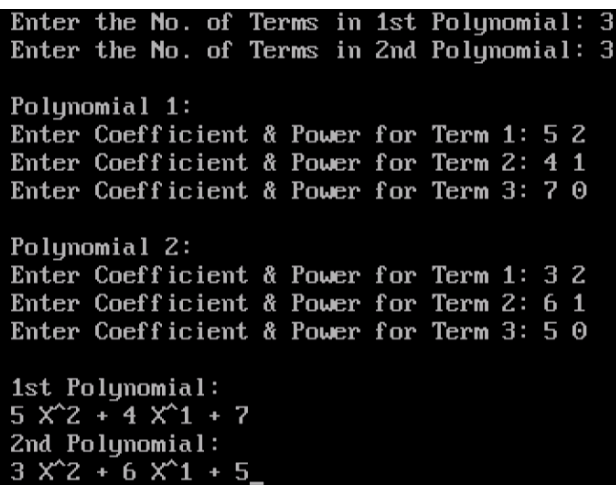


```
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C
1-[]
struct Node* createnode(int coeff, int power)
{
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->coeff = coeff;
    newNode->power = power;
    newNode->next = NULL;
    return newNode;
}

void printList(struct Node* head)
{
    struct Node* temp = head;
    while(temp->next!=NULL)
    {
        printf("%i X^%i + ",temp->coeff,temp->power);
        temp = temp->next;
    }
    printf("%i",temp->coeff);
}

80:78
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```

Output: -



```
Enter the No. of Terms in 1st Polynomial: 3
Enter the No. of Terms in 2nd Polynomial: 3

Polynomial 1:
Enter Coefficient & Power for Term 1: 5 2
Enter Coefficient & Power for Term 2: 4 1
Enter Coefficient & Power for Term 3: 7 0

Polynomial 2:
Enter Coefficient & Power for Term 1: 3 2
Enter Coefficient & Power for Term 2: 6 1
Enter Coefficient & Power for Term 3: 5 0

1st Polynomial:
5 X^2 + 4 X^1 + 7
2nd Polynomial:
3 X^2 + 6 X^1 + 5_
```

Practical Related Questions:

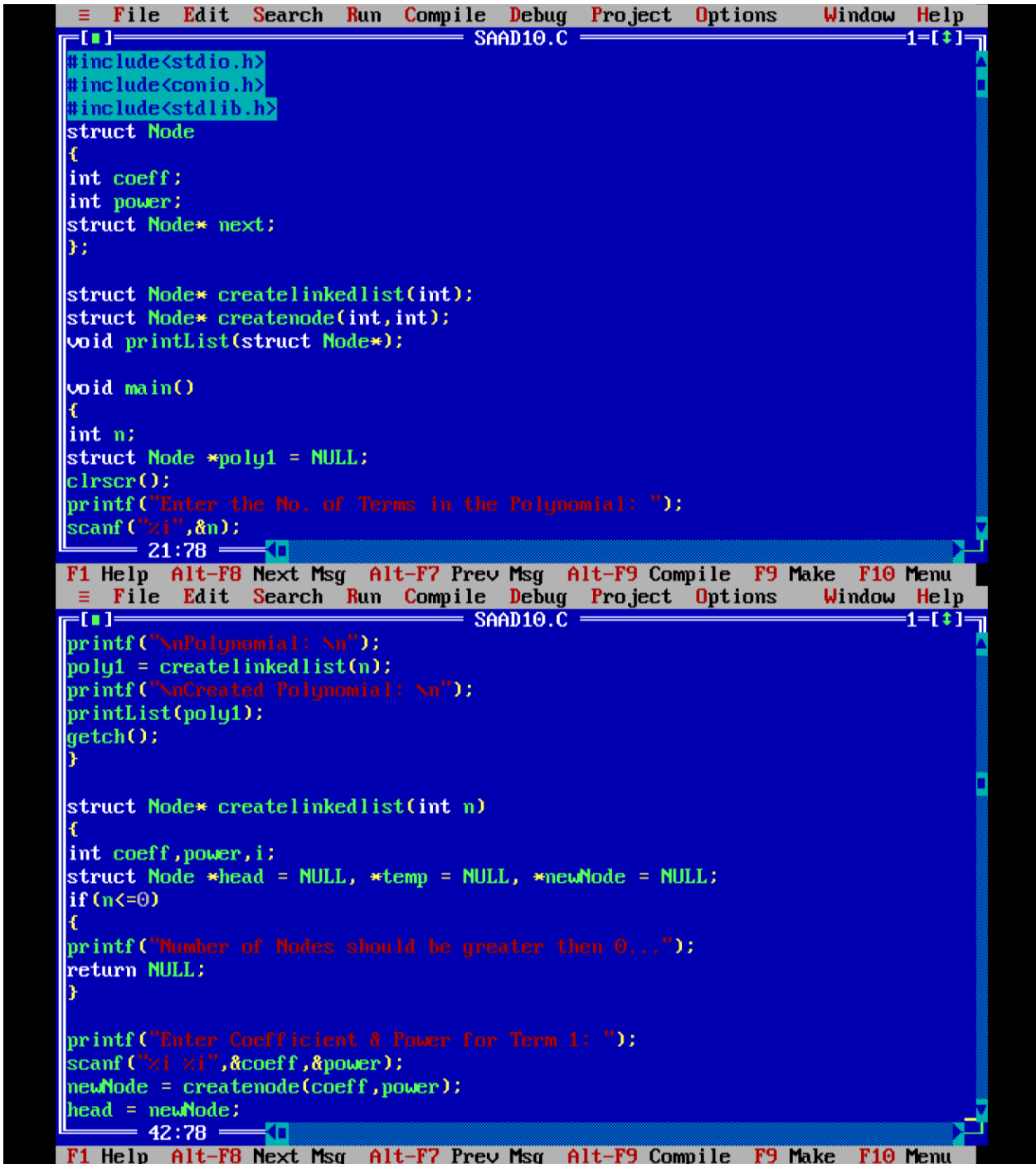
1. Write a node structure to represent a polynomial using linked list

Ans:

```
struct Node
{
int coefficient;
int power;
struct Node* next
};
```

2. Write a C program to Create a polynomial $5x^4 + 3x^2 + 1$.

Ans:



```
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+]
```

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

struct Node* createlinkedlist(int);
struct Node* createnode(int,int);
void printList(struct Node*);

void main()
{
int n;
struct Node *poly1 = NULL;
clrscr();
printf("Enter the No. of Terms in the Polynomial: ");
scanf("%i",&n);
21:78
```

```
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File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+]
```

```
printf("\nPolynomial: \n");
poly1 = createlinkedlist(n);
printf("\nCreated Polynomial: \n");
printList(poly1);
getch();
}

struct Node* createlinkedlist(int n)
{
int coeff,power,i;
struct Node *head = NULL, *temp = NULL, *newNode = NULL;
if(n<=0)
{
printf("Number of Nodes should be greater then 0...");
return NULL;
}

printf("Enter Coefficient & Power for Term 1: ");
scanf("%i %i",&coeff,&power);
newNode = createnode(coeff,power);
head = newNode;
42:78
```

```
F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
```

```
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+]
temp = newNode;

for(i=2;i<=n;i++)
{
printf("Enter Coefficient & Power for Term %i: ",i);
scanf("%i %i",&coeff,&power);
newNode = createnode(coeff,power);
temp->next = newNode;
temp = temp->next;
}
return head;
}

struct Node* createnode(int coeff, int power)
{
struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
newNode->coeff = coeff;
newNode->power = power;
newNode->next = NULL;
return newNode;
}
63:78

F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1-[+]
void printList(struct Node* head)
{
struct Node* temp = head;
while(temp->next!=NULL)
{
printf("%i X^%i + ",temp->coeff,temp->power);
temp = temp->next;
}
printf("%i",temp->coeff);
}
75:78

F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
```

Output:

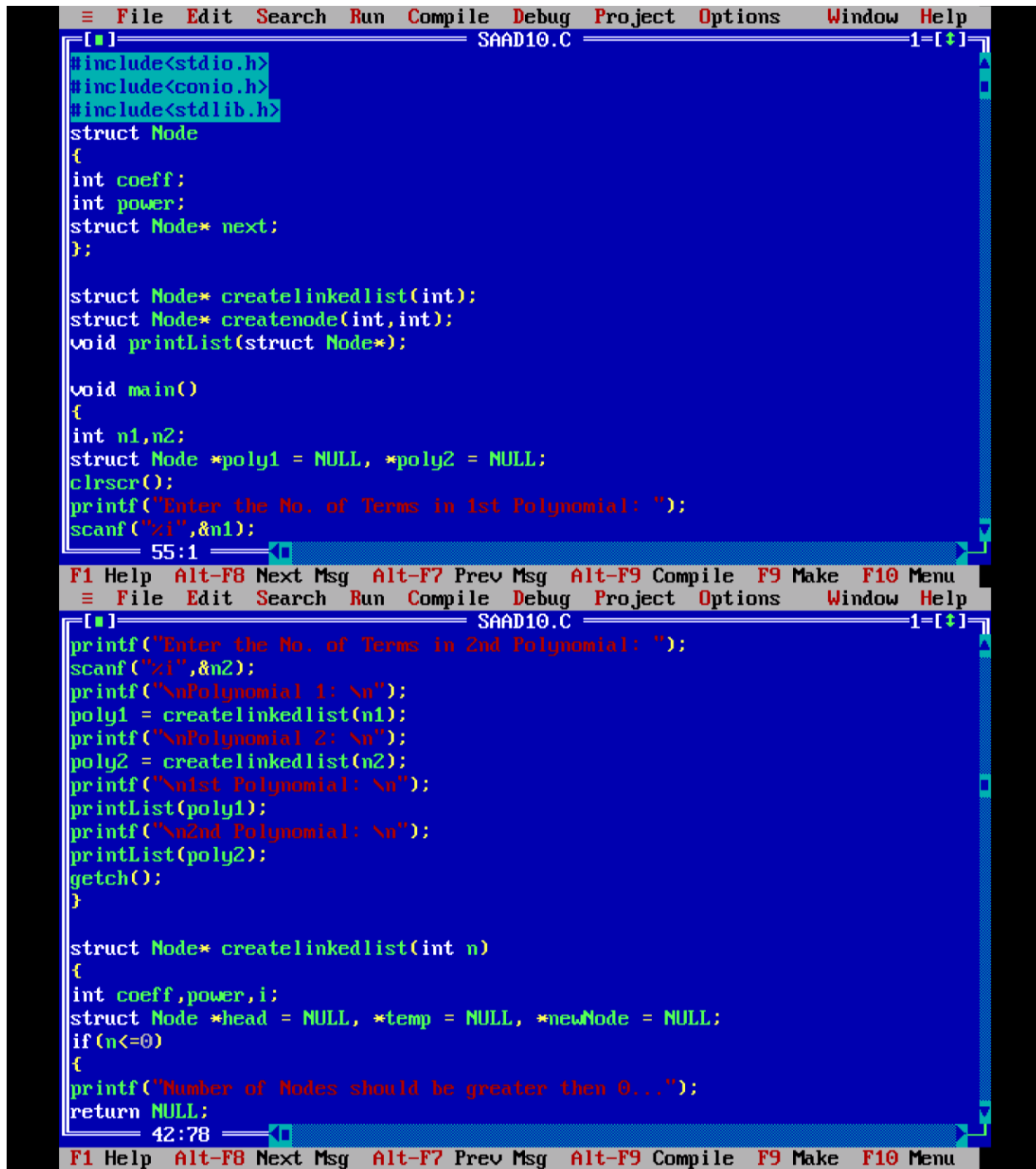
```
Enter the No. of Terms in the Polynomial: 3

Polynomial:
Enter Coefficient & Power for Term 1: 2 2
Enter Coefficient & Power for Term 2: 3 1
Enter Coefficient & Power for Term 3: 5 0

Created Polynomial:
2 X^2 + 3 X^1 + 5
```

3. Write a C program to display created polynomials.

Ans:



```
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1=[↑]
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct Node
{
int coeff;
int power;
struct Node* next;
};

struct Node* createlinkedlist(int);
struct Node* createnode(int,int);
void printList(struct Node*);

void main()
{
int n1,n2;
struct Node *poly1 = NULL, *poly2 = NULL;
clrscr();
printf("Enter the No. of Terms in 1st Polynomial: ");
scanf("%i",&n1);
55:1

F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
File Edit Search Run Compile Debug Project Options Window Help
SAAD10.C 1=[↑]
printf("Enter the No. of Terms in 2nd Polynomial: ");
scanf("%i",&n2);
printf("\nPolynomial 1: \n");
poly1 = createlinkedlist(n1);
printf("\nPolynomial 2: \n");
poly2 = createlinkedlist(n2);
printf("\n1st Polynomial: \n");
printList(poly1);
printf("\n2nd Polynomial: \n");
printList(poly2);
getch();
}

struct Node* createlinkedlist(int n)
{
int coeff,power,i;
struct Node *head = NULL, *temp = NULL, *newNode = NULL;
if(n<=0)
{
printf("Number of Nodes should be greater then 0...");
return NULL;
42:78

F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
```

```
≡ File Edit Search Run Compile Debug Project Options Window Help
[.] SAAD10.C 1-[+]
```

```
return NULL;
}

printf("Enter Coefficient & Power for Term 1: ");
scanf("%i %i",&coeff,&power);
newNode = createnode(coeff,power);
head = newNode;
temp = newNode;

for(i=2;i<=n;i++)
{
printf("Enter Coefficient & Power for Term %i: ",i);
scanf("%i %i",&coeff,&power);
newNode = createnode(coeff,power);
temp->next = newNode;
temp = temp->next;
}
return head;
}

struct Node* createnode(int coeff, int power)
62:78
```

```
F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
≡ File Edit Search Run Compile Debug Project Options Window Help
[.] SAAD10.C 1-[+]
```

```
struct Node* createnode(int coeff, int power)
{
struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
newNode->coeff = coeff;
newNode->power = power;
newNode->next = NULL;
return newNode;
}

void printList(struct Node* head)
{
struct Node* temp = head;
while(temp->next!=NULL)
{
printf("%i X^%i + ",temp->coeff,temp->power);
temp = temp->next;
}
printf("%i",temp->coeff);
}

80:78
```

```
F1 Help Alt-F8 Next Msg Alt-F7 Prev Msg Alt-F9 Compile F9 Make F10 Menu
```


Output: -

```
Enter the No. of Terms in 1st Polynomial: 3
Enter the No. of Terms in 2nd Polynomial: 3

Polynomial 1:
Enter Coefficient & Power for Term 1: 5 2
Enter Coefficient & Power for Term 2: 4 1
Enter Coefficient & Power for Term 3: 7 0

Polynomial 2:
Enter Coefficient & Power for Term 1: 3 2
Enter Coefficient & Power for Term 2: 6 1
Enter Coefficient & Power for Term 3: 5 0

1st Polynomial:
5 X^2 + 4 X^1 + 7
2nd Polynomial:
3 X^2 + 6 X^1 + 5_
```

Marks Obtained			Dated signature of Teacher
Process Related (35)	Product Related (15)	Total (50)	

