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PIMPRI CHINCHWAD COLLEGE OF ENGINEERING
(An Autonomous Institute)

Class : SY BTech	Acad. Yr. 2025-26	Semester : I
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Department: Computer Engineering		Division : A
Course Name : Data Structures Laboratory		Code: BCE23PC02
Completion Date : 13/08/2025		

Assignment No.

Problem Statement:

Write a program to perform Polynomial Addition using Linked Lists

- Each term is a node (with coefficient and power).
- Add two polynomials represented by linked lists.

Source Code :

```
#include <iostream>
#include <cstdlib>
using namespace std;

class node {
public:
    int power = 0;
    int coeff = 0;
    node* next = NULL;
    node() {}
    node(int coef, int p) {
        coeff = coef;
        power = p;
    }
};

class LL {
public:
    node* head = NULL;
    node* tail = head;
```

```
void insert_var(int coef, int p) {
    node* temp = new node(coef, p);
    if (head == NULL) {
        head = temp;
        tail = head;
    } else {
        tail->next = temp;
        tail = temp;
    }
}

void print() {
    if (!head) {
        cout << "Polynomial is empty.\n";
        return;
    }
    node* it = head;
    while (it != NULL) {
        cout << it->coeff << "x^" << it->power;
        if (it->next != NULL) cout << " + ";
        it = it->next;
    }
    cout << "\n";
}

void add_ply(LL poly1, LL poly2) {
    node* temp1 = poly1.head;
    node* temp2 = poly2.head;

    while (temp1 != NULL && temp2 != NULL) {
        if (temp1->power == temp2->power) {
            insert_var(temp1->coeff + temp2->coeff, temp1->power);
            temp1 = temp1->next;
            temp2 = temp2->next;
        }
        else if (temp1->power > temp2->power) { // Descending order fix
            insert_var(temp1->coeff, temp1->power);
            temp1 = temp1->next;
        }
        else {
            insert_var(temp2->coeff, temp2->power);
            temp2 = temp2->next;
        }
    }
}
```

```
while (temp1 != NULL) {
    insert_var(temp1->coeff, temp1->power);
    temp1 = temp1->next;
}
while (temp2 != NULL) {
    insert_var(temp2->coeff, temp2->power);
    temp2 = temp2->next;
}
}

void clear() {
    node* temp = head;
    while (temp) {
        node* del = temp;
        temp = temp->next;
        delete del;
    }
    head = tail = NULL;
}

};

int main() {
    LL poly1, poly2, sum;
    int choice;

    while (true) {
        cout << "\n--- Polynomial Menu ---\n";
        cout << "1. Insert term in Polynomial 1\n";
        cout << "2. Insert term in Polynomial 2\n";
        cout << "3. Display Polynomial 1\n";
        cout << "4. Display Polynomial 2\n";
        cout << "5. Add Polynomials\n";
        cout << "6. Exit\n";
        cout << "Enter choice: ";
        cin >> choice;

        if (choice == 1) {
            int c, p;
            cout << "Enter coefficient and power: ";
            cin >> c >> p;
            poly1.insert_var(c, p);
        }
        else if (choice == 2) {
            int c, p;
            cout << "Enter coefficient and power: ";
            cin >> c >> p;
```

```
        poly2.insert_var(c, p);
    }
    else if (choice == 3) {
        cout << "Polynomial 1: ";
        poly1.print();
    }
    else if (choice == 4) {
        cout << "Polynomial 2: ";
        poly2.print();
    }
    else if (choice == 5) {
        sum.clear();
        sum.add_ply(poly1, poly2);
        cout << "Sum: ";
        sum.print();
    }
    else if (choice == 6) {
        break;
    }
    else {
        cout << "Invalid choice!\n";
    }
}

return 0;
}
```

Screen Shot of Output :

```
Polynomial 1:  $2x^3 + 4x^2 + 7x^0$ 
```

```
--- Polynomial Menu ---
```

1. Insert term in Polynomial 1
2. Insert term in Polynomial 2
3. Display Polynomial 1
4. Display Polynomial 2
5. Add Polynomials
6. Exit

```
Enter choice: 4
```

```
Polynomial 2:  $3x^3 + 8x^1$ 
```

```
--- Polynomial Menu ---
```

1. Insert term in Polynomial 1
2. Insert term in Polynomial 2
3. Display Polynomial 1
4. Display Polynomial 2
5. Add Polynomials
6. Exit

```
Enter choice: 5
```

```
Sum:  $5x^3 + 4x^2 + 8x^1 + 7x^0$ 
```

```
--- Polynomial Menu ---
```

1. Insert term in Polynomial 1
2. Insert term in Polynomial 2
3. Display Polynomial 1
4. Display Polynomial 2
5. Add Polynomials
6. Exit

```
Enter choice: 6
```

Conclusion: Thus we have performed polynomial addition using Linked Lists