**Expt-7**

**Consider a polynomial addition for two polynomials. Develop and execute a program in C using suitable data structures to implement the same**

#include <stdio.h>

#include <stdlib.h>

// Structure for a polynomial term

struct Node {

int coeff, exp;

struct Node\* next;

};

// Function to create and insert a new node

struct Node\* insert(struct Node\* head, int coeff, int exp) {

struct Node\* newNode = (struct Node\*)malloc(sizeof(struct Node));

newNode->coeff = coeff;

newNode->exp = exp;

newNode->next = NULL;

if (!head || head->exp < exp) {

newNode->next = head;

return newNode;

}

struct Node\* current = head;

while (current->next && current->next->exp >= exp)

current = current->next;

if (current->exp == exp) {

current->coeff += coeff; // Combine like terms

free(newNode);

} else {

newNode->next = current->next;

current->next = newNode;

}

return head;

}

// Function to add two polynomials

struct Node\* addPolynomials(struct Node\* poly1, struct Node\* poly2) {

while (poly2) {

poly1 = insert(poly1, poly2->coeff, poly2->exp);

poly2 = poly2->next;

}

return poly1;

}

// Function to print a polynomial

void printPolynomial(struct Node\* poly) {

while (poly) {

printf("%dx^%d", poly->coeff, poly->exp);

poly = poly->next;

if (poly) printf(" + ");

}

printf("\n");

}

int main() {

struct Node \*poly1 = NULL, \*poly2 = NULL;

int n, coeff, exp;

// Input for first polynomial

printf("Enter number of terms in first polynomial: ");

scanf("%d", &n);

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

printf("Enter coeff and exp: ");

scanf("%d %d", &coeff, &exp);

poly1 = insert(poly1, coeff, exp);

}

// Input for second polynomial

printf("Enter number of terms in second polynomial: ");

scanf("%d", &n);

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

printf("Enter coeff and exp: ");

scanf("%d %d", &coeff, &exp);

poly2 = insert(poly2, coeff, exp);

}

// Add the polynomials

struct Node\* sum = addPolynomials(poly1, poly2);

// Display results

printf("First Polynomial: ");

printPolynomial(poly1);

printf("Second Polynomial: ");

printPolynomial(poly2);

printf("Sum of Polynomials: ");

printPolynomial(sum);

return 0;

}