**9. Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes**

**a. Represent and Evaluate a Polynomial P(x,y,z) = 6x2y2z-4yz5+3x3yz+2xy5z-2xyz3**

**b. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z)**

**Support the program with appropriate functions for each of the above operations**

#include<stdio.h>

#include<math.h>

#include<stdlib.h>

#include<math.h>

typedef struct node

{

int expo,coef;

struct node \*next;

}node;

node \* insert(node \*,int,int);

node \* create();

node \* add(node \*p1,node \*p2);

int eval(node \*p1);

void display(node \*head);

node \*insert(node\*head,int expo1,int coef1)

{

node \*p,\*q;

p=(node \*)malloc(sizeof(node));

p->expo=expo1;

p->coef=coef1;

p->next=NULL;

if(head==NULL)

{

head=p;

head->next=head;

return(head);

}

if(expo1>head->expo)

{

p->next=head->next;

head->next=p;

head=p;

return(head);

}

if(expo1==head->expo)

{

head->coef=head->coef+coef1;

return(head);

}

q=head;

while(q->next!=head&&expo1>=q->next->expo)

q=q->next;

if(p->expo==q->expo)

q->coef=q->coef+coef1;

else

{

p->next=q->next;

q->next=p;

}

return(head);

}

node \*create()

{

int n,i,expo1,coef1;

node \*head=NULL;

printf("\n\n Enter no of terms of polynomial==>");

scanf("%d",&n);

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

{

printf("\n\nEnter coef & expo==>");

scanf("%d%d",&coef1,&expo1);

head=insert(head,expo1,coef1);

}

return(head);

}

node \*add(node \*p1,node \*p2)

{

node \*p;

node \*head=NULL;

printf("\n\n\nAddition of polynomial==>");

p=p1->next;

do

{

head=insert(head,p->expo,p->coef);

p=p->next;

}while(p!=p1->next);

p=p2->next;

do

{

head=insert(head,p->expo,p->coef);

p=p->next;

}while(p!=p2->next);

return(head);

}

int eval(node \*head)

{

node \*p;

int x,ans=0;

printf("\n\nEnter the value of x=");

scanf("%d",&x);

p=head->next;

do

{

ans=ans+p->coef\*pow(x,p->expo);

p=p->next;

}while(p!=head->next);

return(ans);

}

void display(node \*head)

{

node \*p,\*q;

int n=0;

q=head->next;

p=head->next;

do

{

n++;

q=q->next;

}while(q!=head->next);

printf("\n\n\tThe polynomial is==>");

do

{

if(n-1)

{

printf("%dx^(%d) + ",p->coef,p->expo);

p=p->next;

}

else

{

printf(" %dx^(%d)",p->coef,p->expo);

p=p->next;

}

n--;

} while(p!=head->next);

}

void main()

{

int a,x,ch;

node \*p1,\*p2,\*p3;

p1=p2=p3=NULL;

while(1)

{

printf("\n\t----------------<< MENU >>---------------");

printf("\n\tPolynomial Operations :");

printf(" 1.Add");

printf("\n\t\t\t\t2.Evaluate");

printf("\n\t\t\t\t3.Exit");

printf("\n\t------------------------------------------- ");

printf("\n\n\n\tEnter your choice==>");

scanf("%d",&ch);

switch(ch)

{

case 1 :

p1=create();

display(p1);

p2=create();

display(p2);

p3=add(p1,p2);

display(p3);

break;

case 2 :

p1=create();

display(p1);

a=eval(p1);

printf("\n\nValue of polynomial=%d",a);

break;

case 3 :

exit(0);

break;

default :

printf("\n\n\tinvalid choice");

break;

}

}

}

**Output:**

root:~/dslab #gedit poly.c

root:~/dslab #cc poly.c

root:~/dslab # ./a.out

-----------------<< MENU >>---------------

Polynomial Operations : 1.Add

2.Evaluate

3.Exit

---------------------------------------------------

Enter your choice==>1

Enter no of terms of polynomial==>3

Enter coef & expo==>

4

3

Enter coef & expo==>

2

2

Enter coef & expo==>

5

1

The polynomial is==>5x^(1) + 2x^(2) + 4x^(3)

Enter no of terms of polynomial==>3

Enter coef & expo==>

4

1

Enter coef & expo==>

3

2

Enter coef & expo==>

5

3

The polynomial is==>4x^(1) + 3x^(2) + 5x^(3)

Addition of polynomial==>

The polynomial is==>9x^(1) + 5x^(2) + 9x^(3)

Enter your choice==>2

Enter no of terms of polynomial==>3

Enter coef & expo==>

3

1

Enter coef & expo==>

4

2

Enter coef & expo==>

5

4

The polynomial is==>3x^(1) + 4x^(2) + 5x^(4)

Enter the value of x=2

Value of polynomial=102

Enter your choice==>3

Exit