**A19:**

Write C++ program for storing binary number using doubly linked lists. Write functions

a) to compute 1‘s and 2‘s complement

b) add two binary numbers

**#include**<iostream>

**#include**<string.h>

**#include**<strings.h>

**using** **namespace** std;

**struct** node

{

**int** data;

node \*prev, \*next;

};

**class** binary

{

**public**:

node \*head1, \*head2,\*head3;;

**binary**()

{

head1=NULL;

head2=NULL;

head3=NULL;

}

node \***insert**(node \*);

**void** **display**(node \*);

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

**void** **one**(node \*);

**void** **two**(node \*);

}b;

node \***binary::insert**(node \*h)

{

node \*newnode,\*temp;

**char** ans;

**while**((ans=cin.get())!='\n')

{

newnode=**new** node;

newnode->next=NULL;

newnode->prev=NULL;

**if**(h==NULL)

{

h=newnode;

temp=newnode;

}

**else**

{

temp->next=newnode;

newnode->prev=temp;

temp=newnode;

}

**if**(ans=='1')

newnode->data=1;

**else**

newnode->data=0;

}

**return**(h);

}

**void** **binary::display**(node \*temp)

{

**do**

{

cout<<temp->data;

temp=temp->next;

}**while**(temp!=NULL);

}

node \***binary::add**(node \*h1, node \*h2)

{

node \*head=NULL;

**int** x,y,z,carry=0;

**if**(h1!=NULL)

**while**(h1->next!=NULL)

h1=h1->next;

**if**(h2!=NULL)

**while**(h2->next!=NULL)

h2=h2->next;

**while**(h1!=NULL || h2!=NULL)

{

x=y=0;

**if**(h1!=NULL)

{

x=h1->data;

h1=h1->prev;

}

**if**(h2!=NULL)

{

y=h2->data;

h2=h2->prev;

}

z=(x+y+carry)%2;

carry=(x+y+carry)/2;

**if**(head==NULL)

{

head= **new** node;

head->next=head->prev=NULL;

}

**else**

{

head->prev=**new** node;

head->prev->next=head;

head=head->prev;

head->prev=NULL;

}

head->data=z;

}

**if**(carry==1)

{

head->prev=**new** node;

head->prev->next=head;

head=head->prev;

head->prev=NULL;

head->data=carry;

}

**return**(head);

}

**void** **binary::one**(node \*h)

{

node \*newnode, \*temp, \*oneh, \*move;

temp=h;

**do**

{

newnode=**new** node;

newnode->data=temp->data;

newnode->next=NULL;

newnode->prev=NULL;

**if**(newnode->data==0)

newnode->data=1;

**else**

newnode->data=0;

**if**(temp==h)

{

oneh=newnode;

move=newnode;

}

**else**

{

move->next=newnode;

newnode->prev=move;

move=newnode;

}

temp=temp->next;

}**while**(temp!=NULL);

b.display(oneh);

}

**void** **binary::two**(node \*h)

{

node \*temp;

**for**(temp=h;temp->next!=NULL;temp=temp->next);

**while**(temp!=NULL && temp->data==0)

temp=temp->prev;

**if**(temp!=NULL)

temp=temp->prev;

**while**(temp!=NULL)

{

**if**(temp->data==0)

temp->data=1;

**else**

temp->data=0;

temp=temp->prev;

}

}

**int** **main**()

{

//binary b;

cout<<"\n enter first binary number:";

b.head1=b.insert(b.head1);

cout<<"\n enter second binary number:";

b.head2=b.insert(b.head2);

cout<<"\nfirst binary number:";

b.display(b.head1);

cout<<"\nsecond binary number:";

b.display(b.head2);

cout<<"\naddition of two binary numbers:";

b.head3=b.add(b.head1, b.head2);

b.display(b.head3);

cout<<"\n 1's complement of first binary number:";

b.one(b.head1);

cout<<"\n 1's complement of second binary number:";

b.one(b.head2);

cout<<"\n 2's complement of first binary number:";

b.two(b.head1);

b.display(b.head1);

cout<<"\n 2's complement of second binary number:";

b.two(b.head2);

b.display(b.head2);

**return** 0;

}

/\*output

enter first binary number11110011

enter second binary number00110011

first binary number:11110011

second binary number:00110011

addition of two binary numbers:100100110

1's complement of first binary number00001100

1's complement of second binary number11001100

2's complement of first binary number00001101

2's complement of second binary number11001101 \*/