INTEGER RESTORING DIVISION

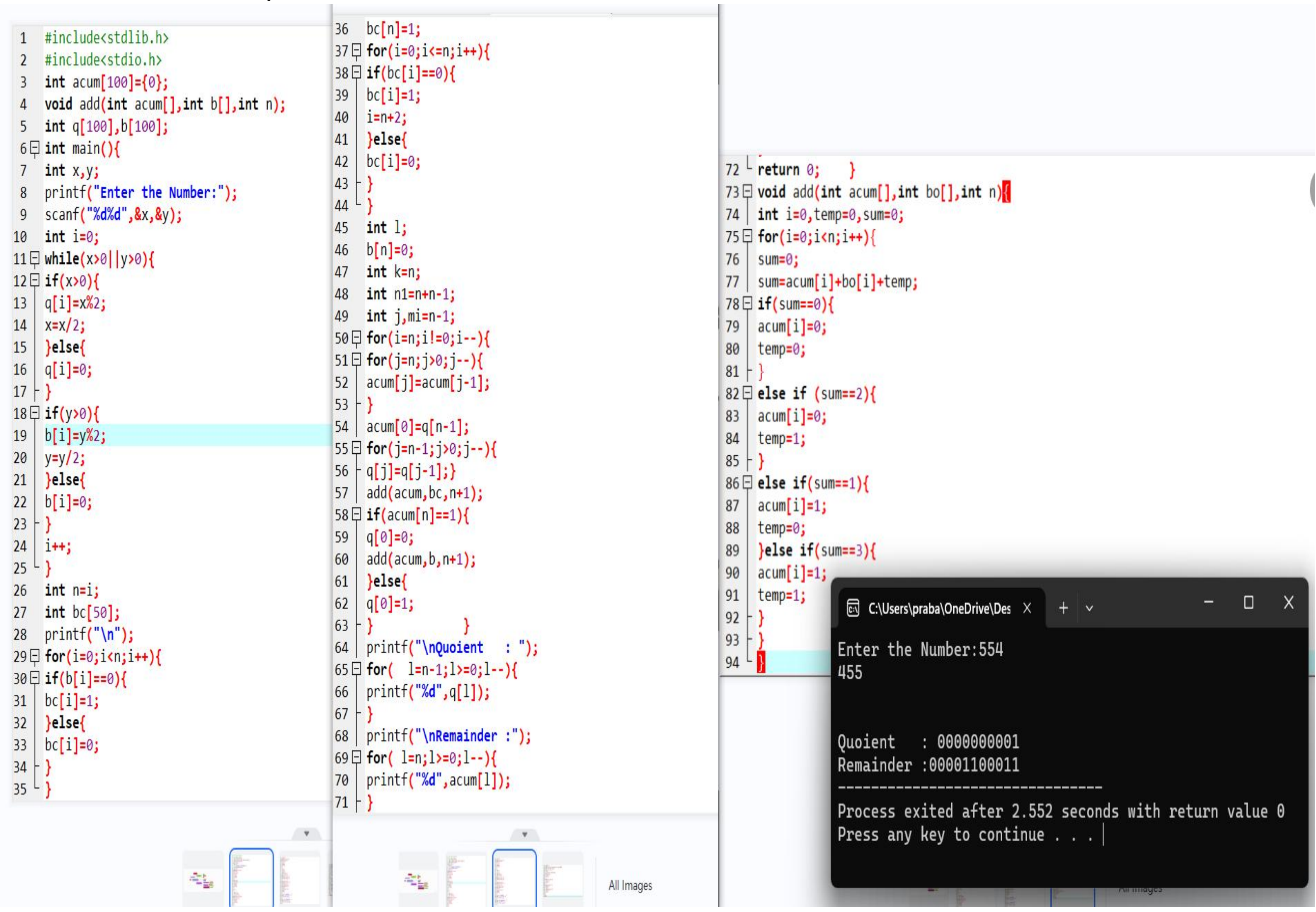
EXP NO: 33

AIM: To write a C program to implement Integer Restoring Division.

ALGORITHM:

1. **Initialize** the dividend (D) and divisor (R).
2. Set up a register A (Accumulator) and initialize it to 0. This will store the remainder.
3. Shift the **dividend** D left by one position and shift its most significant bit into A (the remainder register).
4. **Subtract** the divisor R from A.
   - If the result is **non-negative**, set the least significant bit of the quotient to 1.
   - If the result is **negative**, restore A by adding the divisor R back and set the least significant bit of the quotient to 0.
5. Repeat steps 3 and 4 for each bit of the dividend (total number of iterations equals the number of bits in the dividend).
6. After all iterations, A contains the remainder, and the quotient register contains the quotient.
7. **Output** the quotient and the remainder.

PROGRAM/OUTPUT SS:



```c
#include<stdlib.h>
#include<stdio.h>
int acum[100]={0};
void add(int acum[],int b[],int n);
int q[100],b[100];
int main(){
int x,y;
printf("Enter the Number:");
scanf("%d%d",&x,&y);
int i=0;
while(x>0||y>0){
if(x>0){
q[i]=x%2;
x=x/2;
}else{
q[i]=0;
}
if(y>0){
b[i]=y%2;
y=y/2;
}else{
b[i]=0;
}
i++;
}
int n=i;
int bc[50];
printf("\n");
for(i=0;i<n;i++){
if(b[i]==0){
bc[i]=1;
}else{
bc[i]=0;
}
}
bc[n]=1;
for(i=0;i<=n;i++){
if(bc[i]==0){
bc[i]=1;
i=n+2;
}else{
bc[i]=0;
}
}
int l;
b[n]=0;
int k=n;
int n1=n+n-1;
int j,mi=n-1;
for(i=n;i!=0;i--){
for(j=n;j>0;j--){
acum[j]=acum[j-1];
}
acum[0]=q[n-1];
for(j=n-1;j>0;j--){
q[j]=q[j-1];}
add(acum,bc,n+1);
if(acum[n]==1){
q[0]=0;
add(acum,b,n+1);
}else{
q[0]=1;
}            }
printf("\nQuoient   : ");
for(  l=n-1;l>=0;l--){
printf("%d",q[l]);
}
printf("\nRemainder :");
for( l=n;l>=0;l--){
printf("%d",acum[l]);
}
return 0;     }
void add(int acum[],int bo[],int n){
int i=0,temp=0,sum=0;
for(i=0;i<n;i++){
sum=0;
sum=acum[i]+bo[i]+temp;
if(sum==0){
acum[i]=0;
temp=0;
}
else if (sum==2){
acum[i]=0;
temp=1;
}
else if(sum==1){
acum[i]=1;
temp=0;
}else if(sum==3){
acum[i]=1;
temp=1;
}
}
}
```

```
Enter the Number:554
455


Quoient   : 0000000001
Remainder :00001100011
--------------------------------
Process exited after 2.552 seconds with return value 0
Press any key to continue . . .
```

RESULT: Thus the given program has been executed successfully using DevC++.