Experiment No. 8
1mplement Restoring algorithm using c- programing
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Aim: To implement Restoring division algorithm using c-programming.

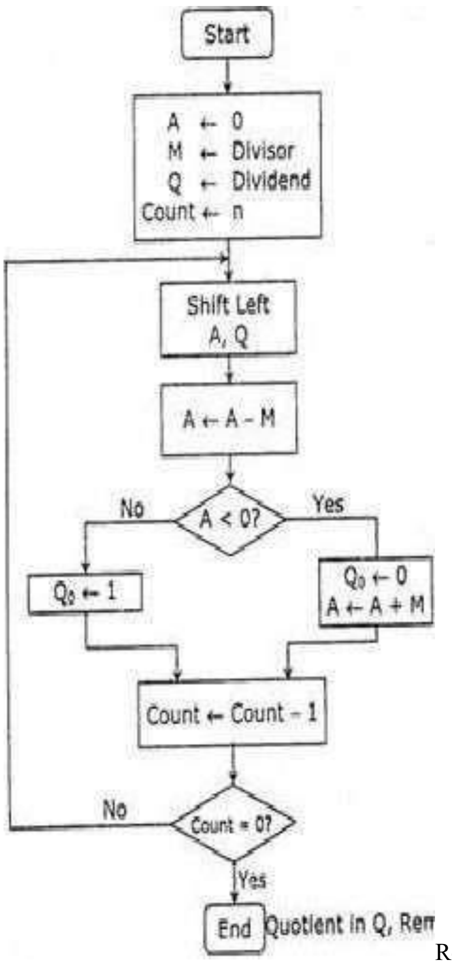
Objective - 1. To understand the working of Restoring division algorithm.
2. To understand how to implement Restoring division algorithm using c-programming.

Theory:
l) The divisor is placed in M register, the dividend placed in Q register. 2) At every step, the A and Q registers together are shifted to the left by I-bit

3) M is subtracted from A to determine whether A divides the partial remainder. If it does, then QC) set to I-bit. Otherwise, QO gets a 0 bit and M must be added back to A to restore the previous value.

4) The count is then decremented and the process continues for n Steps. At the end, the quotient is in the Q register and the remainder is in the A register.

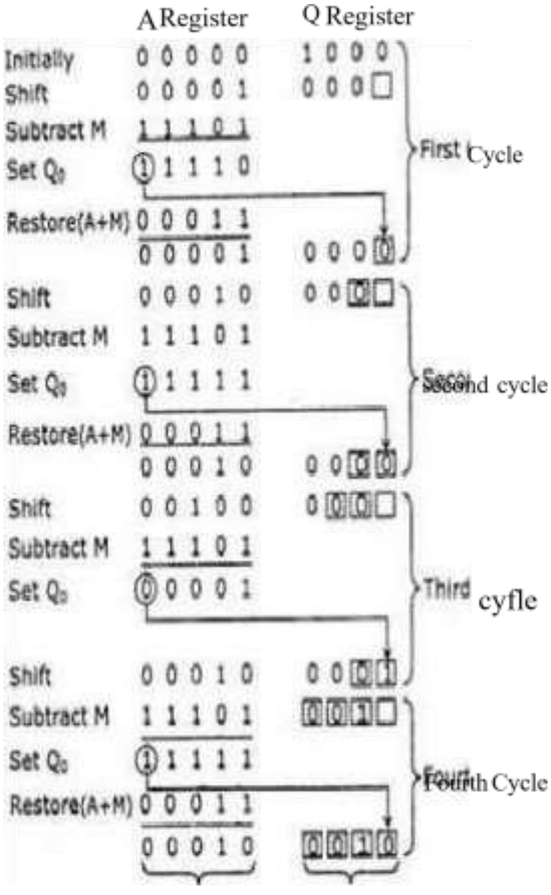
Flowchart



Remainder

in A

Perform • 3 by restoring division technique,



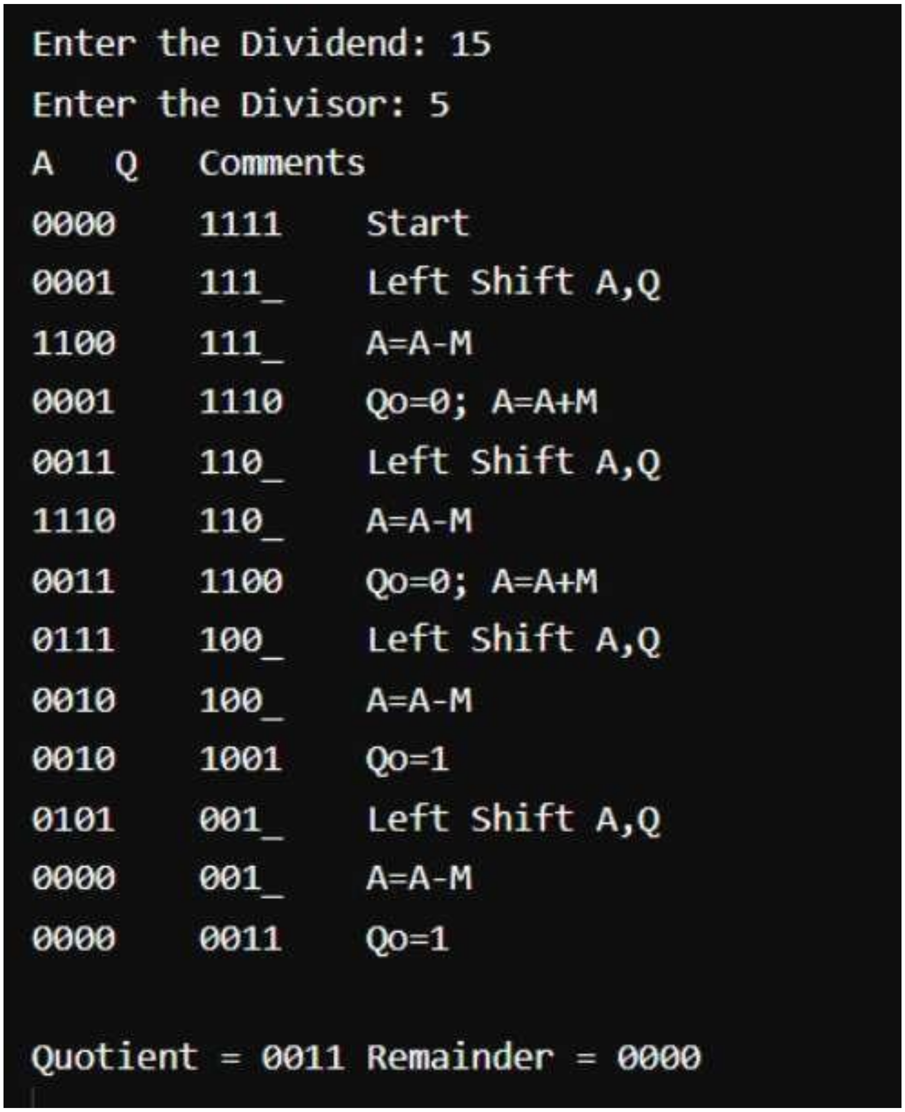
	A Register	Q Register	
Initially	0 0 0 0 0	1 0 0 0	First Cycle
Shift	0 0 0 0 1	0 0 0 □	
Subtract M	1 1 1 0 1		
Set Q₀	① 1 1 1 0		
Restore(A+M)	0 0 0 1 1		
	0 0 0 0 1	0 0 0 0	
Shift	0 0 0 1 0	0 0 0 □	Second cycle
Subtract M	1 1 1 0 1		
Set Q₀	① 1 1 1 1		
Restore(A+M)	0 0 0 1 1		
	0 0 0 1 0	0 0 0 0	
Shift	0 0 1 0 0	0 0 0 □	Third cyfle
Subtract M	1 1 1 0 1		
Set Q₀	⓪ 0 0 0 1		
Shift	0 0 0 1 0	0 0 0 1	
Subtract M	1 1 1 0 1	0 0 1 □	Fourth Cycle
Set Q₀	① 1 1 1 1		
Restore(A+M)	0 0 0 1 1		
	0 0 0 1 0	0 0 1 0	

Rem"nder Quotient

Program #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=n1;l>=0;l--)
           {
              printf("%d",q[l]);
           }
              printf("\nRemainder : ");
              for( l=n;l>=0;l--)
            {
             printf("%d",acu m[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]+b o[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;
              }
      }
}
```

Output-



```
Enter the Dividend: 15
Enter the Divisor: 5
A   Q   Comments
0000    1111    Start
0001    111_    Left Shift A,Q
1100    111_    A=A-M
0001    1110    Qo=0; A=A+M
0011    110_    Left Shift A,Q
1110    110_    A=A-M
0011    1100    Qo=0; A=A+M
0111    100_    Left Shift A,Q
0010    100_    A=A-M
0010    1001    Qo=1
0101    001_    Left Shift A,Q
0000    001_    A=A-M
0000    0011    Qo=1

Quotient = 0011 Remainder = 0000
```

Conclusion - The aim was to implement the Restoring division algorithm in C programming, optimizing the division process by restoring partial remainders and quotients systematically for accurate results.