

**EXPERIMENT 13: Write a program for error detecting code using  
CRC-CCITT (16-bits).**

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**Code:**

```
#include<stdio.h>
char m[50],g[50],r[50],q[50],temp[50];
void caltrans(int);
void crc(int);
void calram();
void shiftl();
int main()
{
    int n,i=0;
    char ch,flag=0;
    printf("Enter the frame bits:");
    while((ch=getc(stdin))!='\n')
        m[i++]=ch;
    n=i;
    for(i=0;i<16;i++)
        m[n++]='0';
    m[n]='\0';
    printf("Message after appending 16 zeros:%s",m);
    for(i=0;i<=16;i++)
        g[i]='0';
    g[0]=g[4]=g[11]=g[16]='1';g[17]='\0';
    printf("\ngenerator:%s\n",g);
    crc(n);
    printf("\n\nquotient:%s",q);
    caltrans(n);
    printf("\ntransmitted frame:%s",m);
    printf("\nEnter transmitted freme:");
    scanf("\n%s",m);
    printf("CRC checking\n");
    crc(n);
    printf("\n\nlast remainder:%s",r);
    for(i=0;i<16;i++)
```

```

if(r[i]!='0')
flag=1;
else
continue;
if(flag==1)
printf("Error during transmission");
else
printf("\n\nReceived freme is correct");
}
void crc(int n)
{
int i,j;
for(i=0;i<n;i++)
temp[i]=m[i];
for(i=0;i<16;i++)
r[i]=m[i];
for(i=0;i<n-16;i++)
{
if(r[0]=='1')
{
q[i]='1';
calram();
}
else
{
q[i]='0';
shiffl();
}
r[16]=m[17+i];
r[17]='\0';
for(j=0;j<=17;j++)
temp[j]=r[j];
}
q[n-16]='\0';
}
void calram()
{

```

```
int i,j;
for(i=1;i<=16;i++)
r[i-1]=((int)temp[i]-48)^((int)g[i]-48)+48;
}
void shiftl()
{
int i;
for(i=1;i<=16;i++)
r[i-1]=r[i];
}
void caltrans(int n)
{
int i,k=0;
for(i=n-16;i<n;i++)
m[i]=((int)m[i]-48)^((int)r[k++]-48)+48;
m[i]='\0';
}
```

## Output:

```
Enter the frame bits:1011
Message after appending 16 zeros:10110000000000000000
generator:10001000000100001
```

```
quotient:1011
transmitted frame:10111011000101101011
Enter transmitted freme:10111011000101101011
CRC checking
```

```
last remainder:0000000000000000
```

```
Received freme is correct
```

```
Enter the frame bits:1011
Message after appending 16 zeros:10110000000000000000
generator:10001000000100001
```

```
quotient:1011
transmitted frame:10111011000101101011
Enter transmitted freme:101
CRC checking
```

```
last remainder:0001000000100001 Error during transmission
```