

## Program to implement CRC

### Code:

```
#include<bits/stdc++.h>
#include<conio.h>
using namespace std;

void divide(vector<int>& gen,vector<int>& remainder,int i){
    if((i+gen.size()-1)>=remainder.size()){
        return;
    }
    while(remainder[i]==0){
        i++;
    }
    for (int j = i; j <i+gen.size(); j++){
        if(remainder[j]!=gen[j-i]){
            remainder[j]=1;
        }
        else{
            remainder[j]=0;
        }
    }
    divide(gen,remainder,i+1);
}

int main(){
    cout<<"*****CRC*****"<<endl;
    int n,m,temp;
    vector<int> msg,gen;
    cout<<"Sender's Side"<<endl<<endl;

    cout<<"Enter length of the message transmitted : ";
    cin>>n;
    cout<<"Enter the message : ";
    for (int i = 0; i < n; i++){
        cin>>temp;
        msg.push_back(temp);
    }
    cout<<"Enter length of the generator : ";
    cin>>m;
    cout<<"Enter the generator : ";
    for (int i = 0; i < m; i++){
        cin>>temp;
        gen.push_back(temp);
    }

    int crc_len = 0;
    for (int i = 0; i < m; i++){
        if(gen[i]!=0){
            crc_len++;
            msg.push_back(0);
        }
    }
}
```

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    }
}
cout<<"Divident after adding zeroes : ";
for (int i = 0; i < msg.size(); i++){
    cout<<msg[i]<<" ";
}
cout<<endl;

vector<int> remainder = msg;
divide(gen,remainder,0);
cout<<"CRC : ";
for (int i = remainder.size()-crc_len; i < remainder.size(); i++){
    cout<<remainder[i]<<" ";
    msg[i]=remainder[i];
}
cout<<endl;
cout<<"Transmitted Message : ";
for (int i = 0; i < msg.size(); i++){
    cout<<msg[i]<<" ";
}
cout<<endl<<"-----"
"<<endl;

```

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cout<<"Receiver's Side"<<endl<<endl;
char choice;
xyz:
cout<<"Has the bit in the message changed ? (y/n) : ";
cin>>choice;
if(choice=='n'){
    cout<<"Received Message : ";
    for (int i = 0; i < msg.size(); i++){
        cout<<msg[i]<<" ";
    }
    cout<<endl;
    remainder = msg;
    divide(gen,remainder,0);
    cout<<"CRC : ";
    for (int i = remainder.size()-crc_len; i < remainder.size(); i++){
        cout<<remainder[i]<<" ";
    }
    cout<<endl;
    cout<<"No Error"<<endl<<endl;
}
else if(choice=='y'){
    int bit;
    cout<<"Which bit from right do you want to change ? : ";
    cin>>bit;
    msg[msg.size()-bit] = (msg[msg.size()-bit]==0)? 1 : 0;
    cout<<"Received Message : ";
    for (int i = 0; i < msg.size(); i++){
        cout<<msg[i]<<" ";
    }
}

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    }
    cout<<endl;
    remainder = msg;
    divide(gen,remainder,0);
    cout<<"CRC : ";
    for (int i = remainder.size()-crc_len; i < remainder.size(); i++){
        cout<<remainder[i]<<" ";
    }
    cout<<endl;
    cout<<"Error"<<endl<<endl;
}
else{
    cout<<"Invalid Choice !!"<<endl;
    goto xyz;
}
getch();
return 0;
}

```

## Output:

```

D:\Patric\crc.exe
*****CRC*****
Sender's Side
Enter length of the message transmitted : 6
Enter the message : 1 0 0 1 0 0
Enter length of the generator : 4
Enter the generator : 1 1 0 1
Divident after adding zeroes : 1 0 0 1 0 0 0 0 0
CRC : 0 0 1
Transmitted Message : 1 0 0 1 0 0 0 0 1
-----
Receiver's Side
Has the bit in the message changed ? (y/n) : n
Received Message : 1 0 0 1 0 0 0 0 1
CRC : 0 0 0
No Error

```

```

C:\Users\Gavin\Desktop\crc.exe
*****CRC*****
Sender's Side
Enter length of the message transmitted : 6
Enter the message : 1 0 0 1 0 0
Enter length of the generator : 4
Enter the generator : 1 1 0 1
Divident after adding zeroes : 1 0 0 1 0 0 0 0 0
CRC : 0 0 1
Transmitted Message : 1 0 0 1 0 0 0 0 1
-----
Receiver's Side
Has the bit in the message changed ? (y/n) : y
Which bit from right do you want to change ? : 2
Received Message : 1 0 0 1 0 0 0 1 1
CRC : 0 1 0
Error

```