

7. Write a program for error detecting code using CRC-CCITT (16- bits).

```
import java.io.*;
import java.util.Scanner;

class crcscanner
{
    public static void main(String a[]) throws IOException
    {

        Scanner sc=new Scanner(System.in);
        int[] message;
        int[] gen;
        int[] app_message;
        int[] rem;
        int[] trans_message;
        int message_bits,gen_bits, total_bits;

        System.out.println("\n Enter number of bits in message : ");
        message_bits=sc.nextInt();

        message=new int[message_bits];
        System.out.println("\n Enter message bits : ");
        for(int i=0; i<message_bits; i++)
            message[i]=sc.nextInt();
        System.out.println("\n Enter number of bits in gen : ");
        gen_bits=sc.nextInt();

        gen=new int[gen_bits];
        System.out.println("\n Enter gen bits : ");
        for(int i=0; i<gen_bits; i++)
        {
            gen[i]=sc.nextInt();
        }

        total_bits=message_bits+gen_bits-1;

        app_message=new int[total_bits];
        rem=new int[total_bits];
        trans_message=new int[total_bits];

        for(int i=0;i<message.length;i++)
        {
            app_message[i]=message[i];
        }

        System.out.print("\n Message bits are : ");
        for(int i=0; i< message_bits; i++)
        {
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System.out.print(message[i]);
    }
    System.out.print("\n Generators bits are : ");
    for(int i=0; i< gen_bits; i++)
    {
        System.out.print(gen[i]);
    }

    System.out.print("\n Appended message is : ");
    for(int i=0; i< app_message.length; i++)
    {
        System.out.print(app_message[i]);
    }

    for(int j=0; j<app_message.length; j++)
    {
        rem[j] = app_message[j];
    }

    rem=computeecrc(app_message, gen, rem);

    for(int i=0;i<app_message.length;i++)
    {
        trans_message[i]=(app_message[i]^rem[i]);
    }

    System.out.println("\n Transmitted message from the transmitter is : ");
    for(int i=0;i<trans_message.length;i++)
    {
        System.out.print(trans_message[i]);
    }

    System.out.println("\n Enter received message of "+total_bits+" bits at receiver end : ");
    for(int i=0; i<trans_message.length; i++)
    {
        trans_message[i]=sc.nextInt();
    }
    System.out.println("\n Received message is :");
    for(int i=0; i< trans_message.length; i++)
    {
        System.out.print(trans_message[i]);
    }

    for(int j=0; j<trans_message.length; j++)
    {
        rem[j] = trans_message[j];
    }
    rem=computeecrc(trans_message, gen, rem);
    for(int i=0; i< rem.length; i++)

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{
    if(rem[i]!=0)

        {
            System.out.println("\n There is Error in the received me    ");
            break;
        }
    if(i==rem.length-1)

        System.out.println("\n There is No Error in the received m ");
    }
}

static int[] computecrc(int app_message[],int gen[], int rem[])
{
    int current=0;
    while(true)
    {
        for(int i=0;i<gen.length;i++)
        {
            rem[current+i]=(rem[current+i]^gen[i]);
        }
        while(rem[current]==0 && current!=rem.length-1)
        {
            current++;
        }
        if((rem.length-current)<gen.length)
        {
            break;
        }
    }
    return rem;
}
}

```