

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

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import java.io.*;
import java.util.Scanner;
class CRC
{
    void div(int a[],int k)
    { int gp[]={1,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,1}; //generating polynomial =  $X^{16} + x^{12} + x^5 + 1$ 
        int count=0;
        for(int i=0;i<k;i++)
        {
            if(a[i]==gp[0])
            {
                for(int j=i;j<17+i;j++)
                {
                    a[j]=a[j]^gp[count++];
                }
                count=0;
            }
        }
    }
    public static void main(String args[])
    {
        int a[]=new int[50];
        int b[]=new int[50];
        int len,k;
        CRC ob=new CRC();
        System.out.println("Enter the length of Data Frame:");
        Scanner scan=new Scanner(System.in); //Creating an object to invoke Scanner
        Function to read objects
        len=scan.nextInt(); //reads the length of Data or Message to be sent
        int flag=0; //indication for the data generated and received are same
        or not.
        System.out.println("Enter the Message:");
        for(int i=0;i<len;i++) //iteration to accept input (the data / Message).
        {
            a[i]=scan.nextInt();
        }
        for(int i=0;i<16;i++) //adding zeros to the string
        {
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        a[len++]=0;
    }
    k=len-16; //retrieving the original data word length

    for(int i=0;i<len;i++) //copying the original Data word into an array b.
    {
        b[i]=a[i];
    }
    ob.div(a,k); //calling an function to use CRC-CCITT 16 bits
    for(int i=0;i<len;i++)
    a[i]=a[i]^b[i]; //produces data transmion bits
    System.out.println("Data to be transmitted: "); //prints data to be transmitted
    for(int i=0;i<len;i++)
    {
        System.out.print(a[i]+" ");
    }
    System.out.println();
    System.out.println("Enter the Reveived Data: "); //Prompt enter the data received
    for(int i=0;i<len;i++)
    {
        a[i]=scan.nextInt();
    }
    ob.div(a, k); //checkes with CRC-CCITT 16 bit. "Note not compare "
    for(int i=0;i<len;i++)
    {
        if(a[i]!=0)
        {
            flag=1;
            break;
        }
    }
    if(flag==1) //prints weather received data is correct or not.
    System.out.println("error in data");
    else
    System.out.println("no error");
}
}

```