```
#include<iostream>
using namespace std;

class ham
{
	int d[7],r[7];
	int c1,c2,c4,c;

public:
	ham()
	{
		c1=0;
		c2=0;
		c4=0;
		c=0;
		for(int k=0;k<7;k++)
		{
			d[k]=0;
			r[k]=0;
		}
	}

	void send()
	{
		cout<<"\nEnter Data : ";
		cin>>d[0]>>d[1]>>d[2]>>d[4];

		d[6]=d[4]^d[2]^d[0];
		d[5]=d[4]^d[1]^d[0];
		d[3]=d[2]^d[1]^d[0];

		cout<<"\n Data : ";
		for(int k=0;k<7;k++)
		{
			cout<<d[k];
		}

		cout<<"\n";
	}

	void rec()
	{
		cout<<"\nEnter received data : ";
		for(int k=0;k<7;k++)
		{
			cin>>r[k];
		}

		c1=r[6]^r[4]^r[2]^r[0];
		c2=r[5]^r[4]^r[1]^r[0];
		c4=r[3]^r[2]^r[1]^r[0];
		c=(c4*4)+(c2*2)+(c1);

		if (c==0)
			cout<<"\nNo error.......!!!!!";
		else
		{
			cout<<"\nError at "<<c<<" position";

			if (r[7-c]==0)
				r[7-c]=1;
			else
				r[7-c]=0;
```

```
                cout<<"\nCorrected Data : ";
                for(int k=0;k<7;k++)
                {
                      cout<<r[k];
                }
          }
          cout<<"\n";

    }
};

int main()
{
    ham h;
    int n;

    do
    {
          cout<<"\n1.send";
          cout<<"\n2.received";
          cout<<"\n3.Exit";
          cout<<"\nEnter your choice : ";
          cin>>n;

          switch(n)
          {
          case 1:
                h.send();
                break;
          case 2:
                h.rec();
                break;
          case 3:
                break;
          default:
                cout<<"\nInvalid Choice..\n";
          }
    }while(n!=3);


    return 0;
}
```

CRC

```
#include <iostream>
using namespace std;
int main()
{
	int fs,gs,rs,f[20],g[10],temp[20],crc[10];
	cout<<"\nEnter size of dataword (fs)";
	cin>>fs;

	cout<<"\nEnter size of divisor (gs)";
	cin>>gs;

	rs=gs-1;

	cout<<"\nEnter Data word : ";
	for(int i=0;i<fs;i++)
		cin>>f[i];
	cout<<"\nDATA WORD : ";
	for(int i=0;i<fs;i++)
		cout<<f[i];

	cout<<"\nEnter Divisor : ";
	for(int i=0;i<gs;i++)
		cin>>g[i];
	cout<<"\nDIVISOR : ";
	for(int i=0;i<gs;i++)
		cout<<g[i];

	for(int i=fs;i<fs+rs;i++)
		f[i]=0;

	for(int i=0;i<fs+rs;i++)
		temp[i]=f[i];

	for(int i=0;i<fs;i++)
	{
		int k=i,j=0;
		if(g[j]>temp[k])
		{
			for(k=i,j=0;j<gs;k++,j++)
			{
				if((temp[k]&&g[j]==1)||(temp[k]&&g[j]==0))
				{
					temp[k]=0;
				}
				else
				{
					temp[k]=1;
				}
			}
		}
	}
	for(int i=0,k=fs;i<rs;i++,k++)
	{
		crc[i]=temp[k];
	}

	cout<<"\n\n";
	cout<<"\nCRC : ";
	for(int i=0;i<rs;i++)
		cout<<crc[i];
	cout<<"\n\n";
```

```
	cout<<"CODE GENERATED : ";
	for(int i=0;i<fs;i++)
	{
		cout<<f[i];
	}
	for(int i=0;i<gs-1;i++)
		cout<<crc[i];


	//RECEIVER
	int rec[20];
	cout<<"\n\nEnter received data";
	for(int i=0;i<fs+rs;i++)
		cin>>rec[i];

	for(int i=0;i<fs;i++)
	{
		int k=i,j=0;
		if(g[j]>rec[k])
		{
			for(k=i,j=0;j<gs;k++,j++)
			{
				if((rec[k]&&g[j]==1)||(rec[k]&&g[j]==0))
				{
					rec[k]=0;
				}
				else
				{
					rec[k]=1;
				}
			}
		}
	}
	for(int i=0,k=fs;i<rs;i++,k++)
	{
		crc[i]=rec[k];
	}

	cout<<"\n\n";
	cout<<"\nREMAINDER :";
	for(int i=0;i<rs;i++)
		cout<<crc[i];
	int flag=1;
	for(int i=0;i<rs;i++)
	{
		if(crc[i]!=0)
			flag=0;
	}
	if (flag==1)
		cout<<"\nTHE RECEVIED CODE IS CORRECT\n";
	else
		cout<<"\nTHE RECEVIED CODE IS INCORRECT\n";



}
```