(Sunday)

Date :

Page :

Assignment

1. If the data $x^7+x^6+x^5+x+1$ is transmitted using divisor x^3+1, find the CRC for the transmitted data.
2. Find the hamming code for the data 10111001 01. If the 8th bit from right is corrupted in the hamming code, show how receive detects an error in the given position.
3. Find the Checksum for data 10101 0001 1100 1100 0101 1100.

Q1) If the data $x^7+x^6+x^5+x+1$ is transmitted using divisor x^3+1, find the CRC for the transmitted data.

⇒ Soln

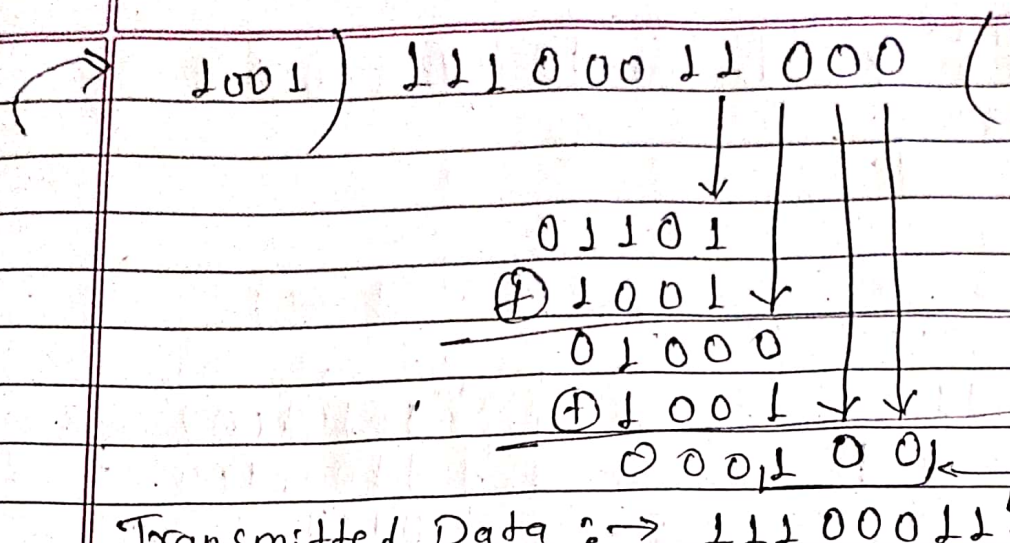
Divisor : 1001 ⇒ 4-1=3.

Data : 11100011

(Sender)

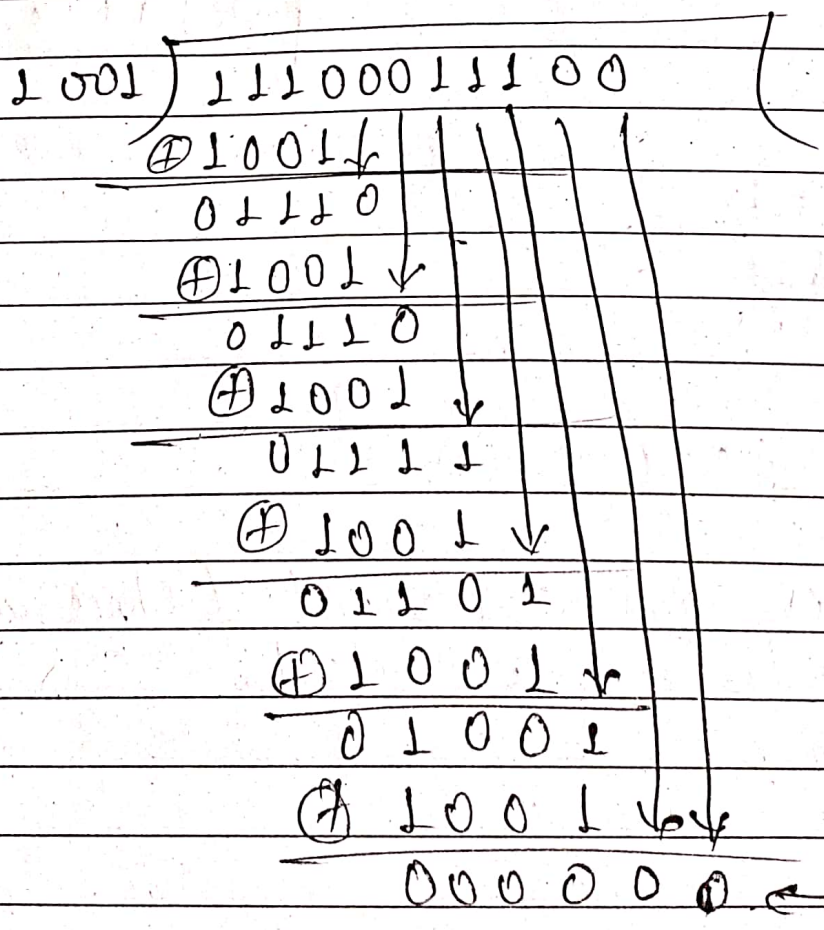
```
1001 ) 11100011 000 (
       ⊕1001
        01110
       ⊕1001
        01110
       ⊕1001
        01111
        1001
        0110
```

Date :
Page :



Transmitted Data :→ 11100011100

Receiver



Therefore,
there isn't corrupt in Data. Data is same as sender's data while receiving.

Date :
Page :

Q2) Find the CheckSum for the data 1010100011100
1100011011100

⇒ Soln:

Sender

(8-bits)

```
  1 1
  10101000
  11001100
+ 01011100
-----------
  11010000
```

Checksum :→ 11010000

```
  1 1 1
  10101000
+ 11001100
-----------
  01110100
+       1
-----------
  01110101
+ 01011100
-----------
  11010001
```

1's Complement of CheckSum:
00101110

Transmitted Data: 11010001 00101110

Receiver

```
  11010001
+ 00101110
-----------
  11111111
```

Checksum: 11111111

Complement of CheckSum: 00000000

Here, Receiver side complement of checksum is zero(0) So, the data is not corrupted.

Date :
Page :

Q3) Find the hamming code for the data 10111001.01. If the 8th bit from right is corrupted in the hamming code, show how receive detects an error in the given position.

(Using Even parity)

$2^r \geq m+r+1$

$2^4 \geq 10+4+1$

$16 \geq 15$ ✓

r_1, r_2, r_4, r_8

4

Soln

Data : 10111 00101

1 0 1 1 1 0 r_8 0 1 0 r_4 1 r_2 r_1

For r_1 :

1 0 1 1 1 0 r_8 0 1 0 r_4 1 r_2 r_1

Parity

r_1 : 0 1 0 0 0 1 → 0

For r_2 :

1 0 1 1 1 0 r_8 0 1 0 r_4 1 r_2 r_1

Parity

r_2 : 1 1 1 0 1 1 → 1

For r_4 :

1 0 1 1 1 0 r_8 0 1 0 r_4 1 r_2 r_1

Parity

r_4 : 1 0 1 0 1 0 → 1

For r_8 :

1 0 1 1 1 0 r_8 0 1 0 r_4 1 r_2 r_1

Parity

r_8 : 1 0 1 1 1 0 → 0

Date: .....
Page: .....

Transmitted Data: (Hamming Code)

1 0 1 1 1 0 0 0 1 0 1 1 1 0

Now, If the 8th bit from right is corrupted hamming Code;

1 0 1 1 1 0 1 0 1 0 1 1 1 0

Receiver

Corrupted Hamming Code → 1 0 1 1 1 0 1 0 1 0 1 1 1 0

Finding Parity bit of r_1, r_2, r_4 & r_8:

r_1 : 0 1 0 0 0 1 0 → 0
r_2 : 1 1 1 0 1 1 1 → 0
r_4 : 1 0 1 0 1 0 1 → 0
r_8 : 1 0 1 1 1 0 1 → 1

$r_8 r_4 r_2 r_1$: 1 0 0 0 ⇒ 8.

There is corrupted data in the 8th place