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Q.3] b → A bit stream 10110 is transmitted using the standard CRC method. The generator polynomial is x^3+x^2+1. What is the actual bit transmitted? How will the receiver detect data received without any error?

→ Given : Dividend = 10110
Divisor = $1x^3 + 1x^2 + 0x^1 + 1x^0$

∴ Divisor = 1101 → n-1
4-1 = $\boxed{3}$

```
          111
1101 | 10110000
     ⊕ 1101
       01100
     ⊕ 1101
       0001000
        ⊕ 1101
          0101
```

as have performed the Ex-OR operations

dataword = 10110   Codeword = ~~101~~

10110	000
	101

→ To check if there is any error.

```
          111
1101 ) 10110101
       ⊕1101↓
        01100
       ⊕1101
        0001101
          ⊕1101
           0000
```

Ans: The "sent" message is correct since we checked using CRC method and the remainder we got is "0000"

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~~Q3] A~~

~~Ans-b~~

* Transmitted Frame:
  - → original data : 10110
  - → CRC bits (remainder) : 101

Transmitted Bit String = 10110101

* Receiver Side Check
  - → Receiver gets : $\boxed{10110101}$
  - → Receiver divides it by the same generator $\boxed{1101}$
  - → If remainder = $\boxed{000}$, then no error.

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Q.3] Ans-b Given:

A bit stream / dataword = $\boxed{1101011011}$

Generator Polynomial = $x^4 + x + 1$

$= 1x^4 + 0x^3 + 0x^2 + 1x^1 + 1x^0$

$\therefore$ Divisor = $\boxed{10011}$ $\rightarrow n-1 \rightarrow 5-1$

$\therefore n = 4$

→

```
          11111
10011 | 11010110110000
      ⊕ 10011
        010011
      ⊕  10011
        00000010110
            ⊕ 10011
              00101100
            ⊕   10011
              0001110 0
            ⊕ ~~10011~~
              ~~01111~~
```

Final CRC bits = 1110

→ Appending the CRC remainder (1110) to the original data.

- original data → 1101011011
- CRC bits → 1110

Ans-i Transmitted bit string =

dataword	CRC
1101011011	1110

Ans → The third bit from left is inverted
ii during transmission.

Original data = $\boxed{1101011011 \mid 1110}$

3rd bit = is inverted from "0" → "1"
~~is inverted~~

∴ The Erroneous received data = $\boxed{1111011011 \mid 1110}$

Dividing the received data by divisor

```
               1111
10011 | 11110110111110
      ⊕ 10011
        01101110
      ⊕ 10011
        01010001
      ⊕  10011
          00010011
        ⊕ 010011
          000001110
```

Ans-ii] After dividing the received data by generator polynomial.

The remainder is "non-zero"
∴ The error is detected.

Q.4] A
18
Ans.b C

a. F
b. R
c. R

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Q.4] An organization is granted the block 18.0.8.0/8. The administrator wants to
Ans-b create "511" fixed-length subnets.

a. Find the subnet mask.
b. Find the number of addresses in each subnet.
c. Find the first and last address in the first subnet.

→ a] Determining the subnet mask.

- The original network is 18.0.0.0/8 (default mask : 255.0.0.0)

∴ To create 511, we need to borrow "n" bits.

$2^n \geq 511$

The smallest "n" satisfying this is "9"

∴ $\boxed{2^9 = 512}$

- New subnet mask length:

8 (original) + 9 (borrowed) = 17 bits

∴ subnet mask = $\boxed{/17}$ (or 255.255.128.0)

→ b] Number of addresses per subnet

- Total bits for hosts:

  32 (total bits) − 17 (6 subnet bits) = $\boxed{15 \text{ bits}}$

- Number of address per subnet:

  $\boxed{2^{15} = 32,768}$ addresses

  This includes Network ID & broadcast address

Ans → c] First and last address in first subnet.

→ First subnet ID : 18.0.0.0/17

→ first usable address : $\boxed{18.0.0.1}$

→ Last usable address : $\boxed{18.0.127.254}$

→ Broadcast address : 18.0.127.255